THE ENGLISH NAVVY.

The English navvy is a class of man which few people (save those whose line of life brings them in contact with him) know anything about. It is seldom the navvy is introduced as a character in novels, pictures, or upon the stage, and, if he is, the chances are ten to one he is misrepresented both in dress, speech and character, for in each of these he has his peculiarities, and differs from the general run of other laborers. Any hulking blackguard who disgraces our streets; any lazy, drunken scamp who may stand idling in a soil-stained dress at our street corners; any thorough-paced scoundrel who, in a suit of moleskin and pilot-cloth, tramps throughout the country, and commits all kinds of dastardly and mean offences, from robbing hen-roosts and clothes' lines to murder, and from whose mouth pours forth torrents of oaths, blasphemy and obscenity, it has been customary of late years to call a navvy; and for newspaper reporters to describe in their writings a rough, bad character, with no known means of earning a livelihood, as a 'man of the navvy class.' There are, of course, exceptions to every rule; and, although the navvy proper is by no means of a saintly, or angelic, or even refined nature, still, in nine cases out of ten, were the villians such as described above, brought before a practiced eye and their stories properly sifted, it would be found that they have no more right to the name of 'navvy' in its proper sense than the thieving, skulking cut-throat camp follower has to the noble and honorable name of soldier.

The word 'navvy' is a shortened form of 'navigator,' a term that was applied in early engineering days to the men who dug out and formed our canals and waterways for the purpose of inland navigation. When George Stevenson, that splendid old Northumbrian, the father of our railways, had perfected his locomotive engine, and he and other engineers began to make railways over various parts of the United Kingdom, and when such men as the late Thomas Brassey appeared in the contracting world to carry out such schemes, bodies of strong men fitted for hard work, and sometimes harder usage, were wanted to perform the heavy toil and stand the rough life unavoidable during the construction of our great iron roads. To these bands, or gangs, of sturdy, strong Englishmen was continued the same term as had originally been used for the old canal excavator, namely, 'navigator,' or 'navvy,' which term has since become general upon all engineering undertakings where skilled excavators are required to construct the earthworks. Many of the old canal navvies doubtlessly continued their career upon the railways. Indeed, grandsons, and even sons of some of the old canal 'navigators' may still be met with on some of our great works, and these will tell with pride that their grandfathers or fathers were so employed, and speak as proudly of the 'old original navigators' as any descendent of a Drake, a Raleigh, or a Frobisher might do of his ancestors, who were navigators in the proper sense of the term. There is an old rhyme still to be heard on railway works:—

I'm a nipper, I'm a tipper, I'm a 'navvy on the line,'
I worked for Thomas Brassey, and he gave me two-and-nine.

which may originally have been made to distinguish between the railway navvy and 'the old original navigator' referred to above.

Before going further into the description of 'navvy life' let it be shown how 'navvy work' is brought about. When a railway, dock, or other company has decided upon the direction or position of any works they wish to construct and they have obtained an Act of Parliament to do so, the work is generally let to a contractor to carry out, and as soon as he has the necessary plant, &c. together, the works begin. Let it be here assumed that the work is a railway. First may be seen the contractor's engineer, or his assistant, busily engaged in setting out the 'fence and batter' widths (the centre line being probably already pegged out by the company's engineer) and a few of these 'batter' pegs having been got in at the beginning of any cuttings and embankments, the navvy can make a start to excavate and tip the earth, the 'setting out,' of course, preceding the excavation and tipping throughout the whole length of the line. The excavation is first done by wheelbarrows and dobbins; and afterwards, as the depth of cutting and embankment, and 'length of lead' increases, by tip-wagons and horses; and as the 'lead' becomes larger a locomotive engine is used instead of horse labor to take the wagons out of the cutting nearly to the tip head; the actual work of running the wagons to the tip being generally performed by horse-power. Having seen how navvy work is brought into existence, and having briefly touched upon the origin of the men and their name, let something of their personal description and life be now shown. First, as regards the description of a proper English navvy—that is, a man of the true type, such as is known to engineers and contractors (especially those of the old school) as a 'blue-stocking,' or thick-legged 'un.' Your 'blue-stocking' is a man averaging from 5 ft. 6in. to 5 ft. 8 in. (sometimes more) in height, broad-chested, well-developed, and of a build and mould not to be surpassed by any other class of workmen in the world. An Englishman is often apt to express admiration and surprise, as well he may, at the splendid limbs one sees displayed in Her Majesty's Highland Scotch regiments, which wear the 'garb of old Gaul,' but let the same Englishman look upon any of our big public works, where excavators are largely employed, and he will there find, especially if there are any 'butty mess gangs' on the job, Saxon limbs of size, mould and strength equal to those which are more picturesquely shown to advantage by the dress of the brave and warlike 'son of the Gael.'

In dress, as has already been noticed at the beginning of this subject, the proper navvy has his peculiarities. We sometimes find him in blue stockings and knee breeches made of moleskin, but more often in trousers of the same material, made with a slit for some inches up the seam of the outside edge, which appears to facilitate the turning up of the bottoms of these garments, a practice that is necessary and beneficial to the sturdy excavator. Hence he is generally to be found with at least two deep turns or 'reefs' of four or five inches in depth in the bottoms of his trousers (blue stockings of course), and high laced-up strong boots. The trousers are always turned up, and worn, whether at work or 'on tramp,' high enough to display the manly calf. The boots are highly decorated with a number of brass eyelet holes over various parts of the surface of them, and also on the tongues thereof, and the latter are frequently cut into strange patterns or lacings at the tops, and made to fall in an ornamental fashion over the boot in the front. A check shirt and (when not at work) a blue pilot-cloth or velveteen waistcoat with large pockets and flaps thereto, are also worn, the flaps of the said pockets, together with the front of the waistcoat, being set off by a great number of white pearl buttons, the size and number of which is apparently decided by the wearer. As many as thirty-two buttons set in ornamental rows, were once counted by the writer of this, on a single waistcoat pocket flap of a navvy ganger who was working in the Hook Norton cutting, upon the Banbury and Cheltenham Railway when it first started. Over the waistcoat, when the day's toil is done, is generally worn a 'slop,' a peculiar garment, which is pulled on over the head after the style of a singlet, and which reaches a little lower down than the hips. These 'slops' are frequently made with immense collars, and, as in the case of the waistcoats, are profusely worked in ornamental stitchings and buttons. If the 'slop' is not worn, one may expect to see a blue pilot monkey jacket (with, of course, a great number of pearl buttons thereon), or a coat of huge dimensions and many pockets, made of various strong and serviceable materials, and which is of great service in poaching, for stowing away game, snares, etc. Around the neck the navvy likes a handkerchief of many colors, oftentimes of silk. A favorite head gear is a cloth cap with a peak; the younger branches of the profession carve or notch the peak on the edge, and, as in the case of boots, like to have a number of brass eyelet holes let therein for ornament. The peak of the cap is generally worn at the back or side of the head, and seldom in front. Such is the general description of the navvy and his dress. His work and life may now be noticed.

Of course, if the works to be constructed are of magnitude, they must be let by the company who determines upon them to a good contractor, or firm of contractors to construct. This being done it is to the contractor's advantage to have good bone and muscle to 'shift the muck,' as the navvy calls the excavating process. A number of wooden huts are therefore generally built on land adjoining, or belonging to the works in question, for the benefit of the men. As the proper navvy is, as a rule, an unmarried man, the huts are let to some of the few married specimens, whose wives look after the internal arrangements thereof and take in a certain number of lodgers, the number being regulated, of course, by the size of the hut. The huts are so built as to keep the man, with his wife and family, free and separate from the lodgers as regards the sleeping arrangements, etc. In one of these navvy huts a lodger pays so much per week for his bed, his 'tommy' (or food), and his washing, 12s. to 15s. being about the rate charged. A peep into one of these huts at dinner time—which, by the way, are usually scrupulously clean—shows at once the character and nationality of the occupants. No useless, sloppy, and weak kinds of food are to be met with, but good hunks of meat, chiefly beef, with vegetables, bread, and a good solid pudding are something like the style one would find put upon the table. It is a well-known fact the English navvy could not do the work he does and stand the hardships, unless well fed up to it. And this he will be, or 'know the reason why' from his landlady. He wants, and has meat more than once a day, besides a proportionate amount of other food, and his 'lowance' of beer. A Scotch engineer once noticed on a railway in the north of Scotland the great amount of work done by English 'butty mess gangs,' in excess of that done by the Highlanders in the same position, and attributed the superiority of the English entirely to their manner of living. The highlanders, he said, would sit to porridge, or fish and potatoes, but in the Englishman's quarters were ever to be found their inseparable 'beef and beer.' In navvy encampments where a goodly number of huts are built in out of the way places, as upon the 'Settle and Carlisle Railway,' and in one or two instances upon the 'Kettering and Manton Line,' there are often to be found licensed 'shanties' for the sale of drink, where the quantity of beer that is consumed is something enormous, and the profits of the keeper of the 'shanty' must indeed be very great.

It is to be regretted that the genuine English navvy appears to be decreasing in numbers. He is not now so easily met with as a few years ago. However, on nearly all big public works some few of his species are to be found; and these, if few in comparison with the number of men engaged, will generally be found in a 'butty mess gang'—that is, a gang of men paid according to the amount of work they do, each man sharing alike with his mate. By this arrangement lazy and weak men are of no use, and, therefore, in the gangs referred to we generally find the cream of navvies; and right well they look while at work, plying pick and

shovel, jumper or grafting tool, or wheeling heavy loads of earth, clay or rock with that strength and determination so characteristic of the Englishman. They at the same time are stripped to their shirts (sometimes to their singlets) with arms bared, and their heads covered by a 'sweating cap,'—a sort of perforated nightcap which admits a current of air to pass over the heated toiler's brow while at work. We shall also find the navvy again, whether he come under the head of 'getter,' 'wheeler,' or 'filler,' if engaged in 'set work,' 'shifting muck' with a rapidity which would startle less robust men. The object to be gained by the navvy in this instance is time. Any number of wagons which can be conveniently filled at one time in the same cutting is called a 'set,' and a certain number of 'sets' are decided upon for a day's work by the contractor's agent or engineer, he being ruled in this decision by the number of men he can get, or work with the greatest advantage, according to the size of the cutting. In 'set work,' however, a great deal depends upon the ganger, and if he does not look sharp after the men the wagons are apt to go out not properly filled, which is a loss to the contractor, and tells seriously against him upon 'certificate days.' However, a good ganger, with a sharp eye and that stentorian, rough voice, which ever accompanies them, and a judicious use of an oath now and then, keeps all square, as a rule, and sends the wagons out properly filled. Too much bullying will not do for your proper navvy, for of all workmen he is the most free and independent, not being tied to, or depending upon, any particular person, place, or time for his livelihood. At the best, so deeply planted is the roving spirit within him, that, for the sake of change only, he will 'jack up' and go on tramp. A few weeks, or perhaps a month or two at longest, generally suffices him for one place, and then off he goes. All his belongings he can carry in a bundle tied up in his 'slop,' and this he fastens on his back, and often tramps many miles to a fresh job, enduring, occasionally, when 'on tramp,' great hardships. By this it will be seen that any attempt at over-bullying will only have the effect of making him 'chuck' down his shovel, put on his 'slop,' or jacket, get his 'back time,' and be off at once.

It may be asked, Is a navvy's life all work and tramping; does he never have any enjoyment? Yes; he enjoys himself in his own way. If any one cares to look for him when his day's work is over, some of the 'old hands' will probably be found with mates, many of whom bear some nick-name, such as, 'Punch,' or 'Nobby,' while some are known by some personal peculiarity, such as 'Ginger Blue,' or 'High-backed Darby Joe,' and others, again are called after their birthplace, as 'Lincoln Bill,' 'Bristol Jack,' etc. These will often sit down, and over their quart of beer indulge in a game of dominoes or cards, or talk over old times, and the fun there used to be on such and such a line when they worked for 'Brassy and Ogilvie,' or 'Peto and Betts,' or other such well-known contractors of the old school. The younger 'Punches' and 'Nobbies' go in for something more lively, especially on pay nights, and are not infrequently joined by the 'old hands.' Then may be heard songs and ballads which it is worth the while of the curious to listen to. Descriptions of bygone and nearly forgotten navy and military fights will be heard sung in an old ballad style now almost obsolete. The ballads themselves must have been handed down in many cases from father to son, as it is impossible to find them in print. It will also be found that such old heroes as Robin Hood, and Dick Turpin still live in the breasts of some of their countrymen. Another favorite bit of amusement, (perhaps sport) a navvy dearly loves is poaching on some well-stocked preserves. As of old the Saxons stole the game which the Norman's appropriated to themselves, so now does the Saxon's descendant still steal from the owners of game. Fighting is another kind of amusement dealt in. Not very much science is seen as a rule in navvy fighting, but unmistakable pluck and endurance is shown. The true navvy always fights fairly, and never kicks, as is often reported. Also he strips to his skin in good English style, and in this way he and his mate will slog away at each other for an hour at a time, the blows given and taken being more like the kick of a horse than anything else. When the fight is finished there is no more ill-feeling, hands are shaken and after a wash down they sit to a quart of ale, friendly as though nothing had taken place between them. With all this rough life, the navvy is not the black-guard many make him out to be. He, it is true, is good at oaths, but they roll out healthily and honestly; and are often free from that horrid and disgusting blasphemy and obscenity which one hears sometimes in our public streets from men of the mechanic class. Civility is a remarkable trait in a navvy's character. He always uses the words, 'sir' or 'master,' when addressing his superiors, and is, in addition, extremely deferential in his bearing toward them. At the same time, his manner is without anything cringing or fawning about it, and totally free from that detestable oiliness which is so palpable in many instances in men who think themselves far superior to the navvy.

Thirteen years ago a gentleman who studied races and characteristics of men called the writer's attention to much in the English navvy's life and ways, which, he said, are remnants of the old Saxon or Norse peculiarities. Having since then ample opportunities to test the truth of this statement, the writer applied himself to the task; and thinks the assertion to be not altogether unfounded. Thus the roving, unsettled spirit, hardihood, strength, and dogged pluck, all of which are found more or less in every true navvy, seem very much like the characteristics displayed by those grand old races. Also the strong aversion to game-laws and gamekeepers, great love of beer, fighting, and boisterous songs and sports, are essentially Saxon traits. The very appearance of the men themselves tallies strongly with some descriptions we meet with of the Saxons and Danes as regards build, and often color. The number of really dark navvies is comparatively few, and these are generally known to their mates as 'Black Muzzle,' 'Gyp,' or 'Darkie. In any country where the navvy is met his ruddy and open countenance and his free and independent life at once proclaim his country and origin, and if we would look back at the men who dug out and formed 'Offa's Dyke' (under the management of some who have claims to be considered among the first really English engineers) we should find less difference, perhaps, between those ancient excavators and the modern English navvy than many imagine. In dress they might differ, but in many other respects, and even speech, it is probable there would exist a greater similarity than some people think. Until late years no one seemed to care for the navvy's welfare. He was left almost entirely to his own resources for amusement or instruction. Since clergymen have taken to visiting navvy huts, and conversing with the men they have found many estimable qualities existing among them which they were ignorant of before. Of course the navvy has his vices—what man has not?—but with all that, there is something so thoroughly genuine and English about him as to show at once a diamond in the rough. The good temper and nature of him is familiar to all who have noticed him. His last crust and pint of beer he will willingly share—even 'on tramp'—with any one less fortunate than himself. The man to be despised, shunned and punished is the scamp, who, assuming the navvy garb, oaths, and gait, tramps from place to place and lives upon what he can beg or steal, and when caught by the law's officers, calls himself a navvy, but who never filled a wagon in his life. Such a villain only brings disgrace and a bad name upon one of the finest, most free, and hard working body of men the world ever produced. The navvy has, perhaps, done more by sheer pluck, strength, and endurance, and unaided by mechanical skill, to extend civilization and commerce than any other workman we know of, and England and Englishmen ought to be (and would be if they properly knew him) more proud of him than they are, and give him and his name a more honorable place among the sons of toil than has hitherto been held.—*Cardiff Mail.*

LIVING IN MEXICO.

During eight months' residence in Mexico I have not seen a bit of butter, a potato, an egg, cooked by itself, chop or steak, tea, sauce, cake, pie or pudding, or those common vegetables which we consider indispensable. Napkins are rarely used, each person wiping his or her face and hands on that portion of the table-cloth which happens to be nearest one of the corner wash-stands. Eating with the fork is not at all according to etiquette, but the spoon or knife must be used, or more properly a tortilla. Mexicans manage the latter with as much dexterity as a Chinese does his chop sticks, curving it between the fingers till it forms something like a spoon, and scooping up the food with it, eating spoon and all. The very old people and the lower classes, use tortillas altogether instead of knives, forks or spoons, the latter "new-fangled notions" being of comparatively recent introduction. It requires considerable practice to successfully manage the tortilla scoop, as I have learned from sad experience. After the banquet is ended, and at intervals during its progress, if one feels so inclined, the mouth is filled with water from the goblet, rinsed with more or less emphasis between the teeth, and then the water is squirted upon the floor. In this process all become expert, from the lady of the house to the smallest child. When fresher water is required, that in the glasses is carelessly tossed upon the dirt floor, where it can do no harm. While waiting for coffee, and afterward, during pauses in the "feast of reason and flow of soul," the gentlemen of the family, and not infrequently the ladies also, settle gracefully back in their chairs and smoke a cigaret or two. I learned a lesson at my very first meal in Mexico.

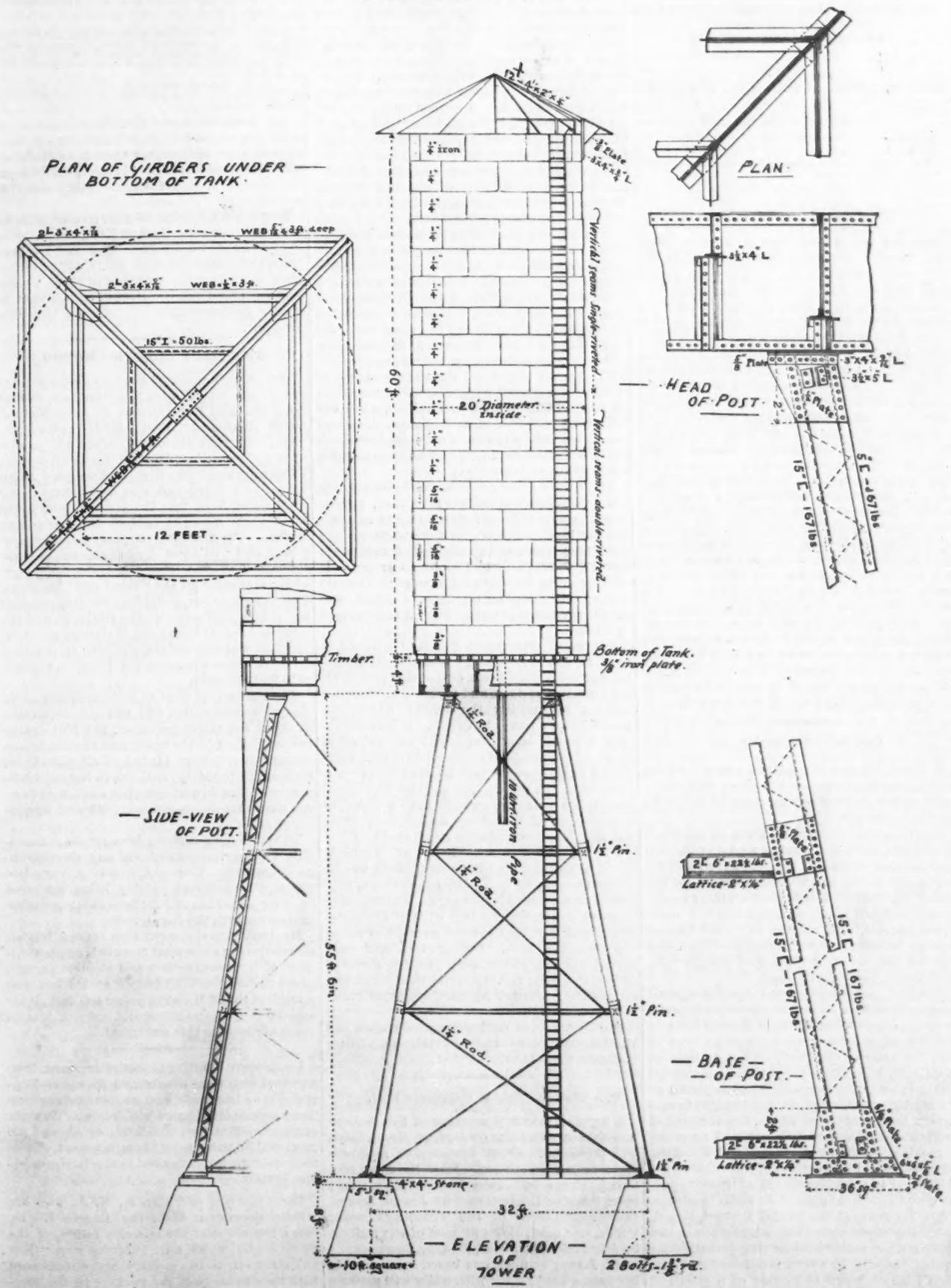
In a Mexican household at five o'clock p. m. we have always chocolate or coffee, served with bread as at breakfast, or with little cakes resembling sweetened crackers, or *pan-de-pulyne*, biscuits made with the national intoxicating beverage, distilled from the century plant. Later in the evening, at any hour from nine o'clock till midnight, comes the supper, which is almost as ceremonious a repast as the dinner, and its counterpart as to menu, minus only the broth and boiled meat. Everybody goes straight to bed from the supper-table, and what with hearty food at unseasonable hours and the eternal grease, garlic and chili, the wonder grows that the nation did not die out long ago of dyspepsia.—*Springfield Republican.*

Princeton Water Tower.

Our illustration shows the details of a novel water tower erected at Princeton, New Jersey, the water-works of which are described by Mr. Croes in this week's number of "The History and Statistics of American Water-works." Mr. Croes was the engineer of these works and the tower was designed for him by Theodore Cooper, C. E., and constructed by Tippett & Wood, of Phillipsburg, N. J. The 10 inch force main is carried up near the centre of the tower and has an expansion joint about 20 feet above the surface of the ground. It is extended in the tank to within 15 feet of the top to ensure circulation. When the pump is not working the water is drawn off through a T branch in the pipe near the bottom of the tank, furnished with a check valve opening into the pipe, which closes when the pump is in operation.

PRINCETON WATER TOWER.

(For Description see page 578.)



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ENGINEERING NEWS AND AMERICAN CONTRACT JOURNAL goes forth to greet its readers this week in a brand new dress throughout. During the five years since our removal to this city, the composition has been done in a printing office where type setting for newspapers is the principal business. We confess to an ambition to enter more largely into the field as publishers and to control as far as it is possible for us to do, in these days of mutual dependence between employer and employe, our own property: whatever profit there is in the business we want it in return for our labor, capital and risks; and we think there is a fair field for enterprise in an active, aggressive competition for the trade of the particular classes of business men to whose liberal patronage we are already so much indebted—hence the purchase of new material, the organization of our own composition room, and the somewhat changed appearance from our last issue. Coming in the same week with two holidays—Evacuation Day and Thanksgiving—we have not been able to get the paper out in just such style as we proposed to do; by the end of the volume we hope to have everything satisfactorily arranged to ensure the most attractive appearance, the most convenient in arrangement, and the most valuable as to amount, variety, and availability for use of information, specially collected and edited for particular patrons of any engineering journal in the world.

LONDON HIGHWAYS.

A correspondent of the *Phila. Press* has been examining the streets of London with reference to the style of paving most in favor, its lifetime, cost, etc.

The first party interviewed was an omnibus-driver, who preferred wood as a paving material, because it was not as slippery as the asphalt or granite block, and when his horses did fall "they went down frequentest on their knees, which is of not much consequence, in a manner of speakin'; on a damp day, that blessed asphalt is like glass, and down goes the 'osses sudden like, all on a heap, and it's precious hard work to get 'em up again."

The foot passengers seem to prefer asphalt because it is drier and cleaner. Shop keepers however complain of the dust arising from it, and that after it has been put down a year or two, the noise of the traffic is louder than at first; this is explained by the compression which takes place in time. In such places as the Poultry and Cheapside, where 15,000 horses pass in the twenty-four hours, the thunder of traffic must necessarily be lessened as much as possible, otherwise fog-horns and speaking trumpets would be required in the transaction of business in the adjacent offices; granite paving could not be thought of in such localities.

The Surveyor of the Strand District Board, stated that there were thirty-eight distinct and irresponsible authorities having jurisdictions outside the city in minor municipal matters. Each district board is formed of a group of parishes, from two to eight in number; the members of the district boards are elected by the vestries of the parish churches. Each district board sends one representative to the Metropolitan Board of Works, founded by act of Parliament in 1855. The district boards however are under no control in regard to the paving, watering and cleaning of streets, and the selection of paving material is a matter of local discretion.

The total area of the Metropolis is 75,490 acres, of which the Strand District Board manages 167 acres. The principal thoroughfare, the Strand, is laid partly with wood and partly with granite blocks, the abutting streets are mostly paved with granite, some with asphalt. The Strand surveyor remarked that wood was not preferred to granite for its cheapness, but because, under the present conditions of traffic, noise must be minimized, and the material must be adopted that would be least injurious to horses. The traffic did not wear out the roads so much as did light horse omnibuses and cabs which gradually displace the paving surface by a series of knocks; the heavy weights slowly dragged over the surface tended rather to consolidate it. He advises a good foundation of concrete in any event, and then thought the cheaper the surfacing and the more easily renewed the better. Six-inch blocks were better than nine-inch blocks, for when knots occurred in the larger size the wear and tear of traffic soon caused irregularities; he thought the tarred felt packing was useless, when the increased cost was figured against the extra wear; creosoting the wood concealed the quality of the wood employed and he regarded this as he did the felt packing.

The cost of wood pavement was given by the Surveyor, at eleven shillings per yard, granite blocks, about eighteen shillings, and asphalt, ten shillings. The contractor guarantees the first three years, and he estimates that it would last two more, or five years in all. Granite pavement has been down in some places twenty years; it is placed on one inch of gravel, covering concrete made with lime; it is expensive to repair.

For wood pavements Portland cement is used in the foundation. Asphalt pavements answer the requirements of London very well; they can be put down and repaired in "halves" without interupting the traffic, which the board has no power to divert. It is easily repaired, which is an important consideration there, as the gas, water, and electric light companies have power to pull up the streets without notice. In the asphalt used for foot pavements, two years use seem to have resulted in compression of the atoms rather than wear. Asphalt, however, requires much cleaning.

The Hackney District Board of Works is taken as an example of the methods in use in the suburban districts. The population is 184,400 the area covered is 3,938 acres. The 90½ miles of roads controlled by this district are stone or asphalt; wood is not used, as noise is not so objectionable here. During the last year twenty-five new streets were paved at a cost of £10,000 ($50,000); the materials used were Victoria stone, Limmer asphalt, Imperial Stone and French asphalt.

The first cost of paving is thrown upon the abutting property owners; the authorities maintain the streets.

The Western Penna. Engineers Society.

A regular monthly meeting of this Society was held in Pittsburg on Nov. 19, Mr. A. Gottleib presiding. About seventy-five members and guests were present. After the usual routine business had been transacted, a paper upon "Boiler Explosions," by Joseph Lowry, ex-Superintendent of the Pittsburgh water works, was read, at the request of the author, by Alexander Dempster, Ex-City Engineer.

Mr. Lowry's paper was based upon the belief that a boiler filled with water will explode and in support of his theory quoted Mr. Downy, Dr. Papin, Guy Lussac, Mr. Hasseler and others. The subject brought out considerable discussion, the recent explosion in the Sligo Mills being the bone of contention, and, as usual all parties agreed to disagree as to cause and theories advanced.

The following resolution was submitted to the Society:

WHEREAS, The adoption of the standard time by the railroads of the country is a step of progress that should receive the aid and encouragement of all the people of the country on account of its convenience of uniformity, therefore

Resolved, That we request the Councils of Pittsburg and Allegheny to change the official time to that of the Eastern standard.

Mr. Lindenthal and Col. Mann objected to indorsing the new standards just yet lest they do not prove the success that is anticipated. Mr. Dempster and others favored the idea on the ground of convenience. The resolution was adopted.

Half a dozen models of river dams and locks were exhibited by Arthur Kirk. Some were improvements on the Bear Trap and Du Bois dams and others were of Mr. Kirk's own invention. The most valuable of these were a pontoon coffer dam, governor attachment to the Du Bois dam, and a substantial hinge for the same.

THE DAFT ELECTRO-MOTOR.

The Electro-Motor of Mr. Leo Daft was very practically tested upon the Saratoga, Mount McGregor and Lake George R. R. on November 24. The road named is twelve miles long, narrow-gauge, with sharp curves and grades of 70 feet per mile. The motor was 8 feet long, 4 feet wide and 5 feet high, and weighed about 2 tons. A third rail was laid between the tracks and from this the electric power was taken to the motor by contact and connecting wheels. The generating engine was of 25-horse power, and was located near the railway station about 500 feet from the track, the power being conveyed to the "third rail" by wires. The passenger car, weighing five tons, carried about fifty gentlemen on the trial trip, and the start and ascent to the end of the circuit, about 1½ miles, was successfully made in 11 minutes, a rate of about five miles per hour, on a grade of 70 feet per mile.

The return trip was the feature of the occasion, at a sharp curve with the motor running at about ten miles per hour, the little thing suddenly jumped the track, and the gentlemen riding upon it were hurled in all directions, landing, fortunately for them, in the sand bordering the track, and suffering no further damage than that due to mashed hats and demoralized clothing.

The passenger car was brought to a standstill by the brakes without any damage to its occupants. The motor was a complete wreck—its electrical gearing being scattered in every direction or bent into unrecognizable shapes beneath the frame work.

Mr. Daft at first seemed daft indeed, but after recovering somewhat from this sudden collapse of both enthusiasm and electric energy, gazed ruefully upon the wreck at his feet and remarked that "We were going too fast;" his associates upon the motor did not ask him to make affidavit to this statement.

LOCOMOTIVE building is on the decrease. Two hundred men were discharged from the Rogers' Works last week, and as soon as work on hand is completed more will follow. Those in charge say that half the force, or about 1,000 men, will be thrown out of employment, unless there is some improvement in the business before spring.

The employes of Paterson, N. J., who are mainly dependent upon the Rogers Works, fear a repetition of the miseries following the panic of 1873, which hurt Paterson worse than any other city in the country, and commenced with the discharge of the workers in the locomotive shops.

THE Trustees of the Brooklyn Bridge have won the suit brought against them by Mr. A. B. Miller, to which we have several times referred in our columns. We give the decision of the Supreme Court in this case as rendered November 26: "The Court holds that inasmuch as the bridge was duly authorized both by Congress and by the State, and inasmuch as Congress, through the Secretary of War, declared after full and careful examination that the proposed bridge if built so as to be 135 feet above mean high water would not injuriously modify the navigation of the river, it cannot be declared a nuisance or an unlawful structure. Complainant has not shown such injury as entitles him to relief, and the decree of the Court below dismissing his bill is affirmed. Opinion by Justice Field.

ENGINEERS' CLUB OF PHILADELPHIA.

At the regular meeting, Nov. 17, Vice-President Wm. A. Ingham in the chair, twenty-seven members and five visitors present. Mr. Coleman Sellers, Jr., read a Memorial of Mr. Howard Fry; Mr. Edw. I. H. Howell presented a sketch based upon his personal observation while in England, on a business visit, of the practice and peculiarities of the English machinists, with regard to machine tools, and also exhibited specimens of polished shafting, from 1¼" to 2¾" in diameter, cold drawn, like wire, but omitted full description, as he expected the inventor to be present at a later meeting.

The secretary read an illustrated paper, by Mr. G. T. Gwilliam, upon the methods of making and placing the Mattresses and Fascines at the extension of the Delaware Breakwater Harbor. The Secretary presented notes, by Mr. John J. Hoopes, to illustrate methods of Computing Tables by successive additions instead of separate calculations. Illustrations are given for the 1st, 2d, 3d and 4th powers, triangles and circles. Mr. John Haug presented illustrated notes upon Boiler Construction, describing especially what should be shown in drawings and specifications for boilers.

Mr. Geo. S. Strong exhibited specimens of Cylindrical and Corrugated Flues. The former readily yielded to the pressure of the fingers, while the latter was trampled upon without injury.

The secretary read, for Mr. C. J. Hexamer, a description of his experiments upon, with a discussion of, the causes of Dust Explosions in Mills. Mr. Wm. A. Ingham considered that some explosions in coal mines are probably attributable to the immense quantity of fine dust in the air, and Mr. T. Mellon Rogers, in response to Mr. Hexamer's comments upon the general absence of adjustable rolls in Philadelphia mills being a common cause of ignition by the friction of foreign metallic particles in the stock, spoke of their general use in the west.

Street Paving in Minneapolis.

The first street pavement was laid in this city two years ago; this year alone 38,000 yards of pavement have been put down at a cost of $85,000. Of this total, 21,652 yards of granite pavement cost $58,623.50; 16,000 yards of cedar-block cost $25,440; 18,000 feet of stone curb and gutters cost $27,800, and 50 stone catch-basins, $800. Cobble-stone paving between the tracks of the horse railways is now forbidden, but 8,000 yards had just been laid for 75 cents per yard.

During the past year there were laid 2¾ miles of wooden side walks, and 2¾ miles of stone side walks, at a total cost of $147,209.92; and in grading, 5,400,000 cubic feet of earth has been moved by contract at an expense of $40,000.

Much new work is ordered for the coming year—aggregating in street paving, 77,000 yards at an estimated cost of $211,750. Granite block is more popular than the cedar, and will be more used.

THE SEWER SYSTEMS OF CHICAGO.

The *Chicago Tribune*, in its issue of November 25, severely criticizes the sewerage system as at present carried out in that city, and points out the fact that the method adopted, of disposing of this material in the nearest water course, is one abandoned a quarter of a century ago by London, Paris, and other European cities.

London reconstructed its system of sewers at a cost of over $150,000,000, after reaching the point Chicago is now expending money to gain. Up to 1855 Paris emptied its sewage into the Seine within the city's limits; since then its 600 miles of sewers have been made to centre in a huge general receptacle under the Place de Concorde, and the accumulated drainage is lead thence by roomy, well-ventilated conduits to Asnieres, on the Seine, four miles below the city. The liquid matter is there discharged, and the solid portions utilized as manures at Gennevilliers.

In America, almost without exception, the sewage is removed by water-carriage, to be disposed of by ocean currents or running streams. The Memphis system theoretically seems a perfect one, but there is much debate as to its practical merits. The economy of the Pullman method is not yet demonstrated, though it bids fair to secure excellent results.

Chicago has spent $6,000,000 in futile attempts to divert the river into a canal; the Fullerton avenue conduit is a failure, and the main conduits are too small for the present demands upon them, as they were designed for a city of 250,000 population.

"The present system amounts to this: Through the centre of the city runs a broad open sewer (the Chicago river and its branches) some ten miles in length, into which is poured the greater portion of the sewage of the city; and which, when it does run off, empties itself into the source of the water supply, and when it does not run into the lake, remains still and stagnates, giving off deadly emanations."

The *Tribune* declares the "pumping remedy" now being constructed, as a worse than useless expenditure of money. The present water supply is 66,000,000 gallons per day; competent authorities state that the sewage volume of a city amounts to from 75 to 125 per cent. of its water supply, for to the water supply must be added the foul rainfall which has scoured the streets and yards. The pumps being erected have a total capacity less than that of the pumps used for the water supply; and if the pumping power was sufficient, the canal intended to lead off this sewage would be insufficient in section to deal with the amount that should properly be poured into it. And further, the pumping system is faulty in having no duplicate pumps.

The *Tribune* concludes by defining the pumping system as "merely tinkering;" it may meet to some extent, a pressing want, but is incapable of extension to meet the rapidly growing expansions of Chicago. It leaves posterity and to-morrow to care for itself.

[With all due respect to the *Tribune*, it might be in order for that journal to suggest some better method of dealing with the exceedingly difficult engineering problem that confronts the Chicago engineer. The Chicago river is now no doubt a sewer, as is any other river traversing a densely populated city, and it would be a sewer still, almost as foul, if every particle of house drainage was diverted from it. The refuse matter from the shipping on its surface and the washings of the streets, would still contaminate it; it is only a question of quantity. The river should not discharge into the lake, for that would destroy the water supply; so it has been determined to make its contents flow "up hill" by pumping, and discharge it into the Mississippi. The towns on the route, will no doubt object; but while the detail of the system may be faulty, as suggested, the system itself or some modification of it, seems the only feasible one to be inaugurated.]

Only the largest of our American cities vote millions of dollars for the construction and extension of water works. In 1876 the two towns of Stockton and Middlesborough, in England, purchased their present system of water works for the sum of about $5,000,000, and the joint corporation is now about to take proceedings, in Parliament, for powers to expend $2,000,000 more in extending their works and improving the supply, which, although so costly, are a source of profit to the corporation.

American Engineers and contractors for the manufacture of materials and machinery, and for the construction of water works and sewerage systems in this country, may well envy the liberal expenditures for these purposes which are chronicled almost weekly in the foreign journals; on the other hand, foreigners are envious of the extravagant sums which are freely appropriated by our general, State and municipal government for the construction of public buildings.

The Civil Engineer in the United States does not play the important *role* in the community that the Civil Engineer does in Great Britain. We have American born engineers equal in learning and ability to any that the world elsewhere can produce, and they can point with pride and satisfaction to the many and mighty monuments of their genius and versatility in the art of engineering construction. But as a class, the civil engineers of America are scarcely known to the general public; they are not noted for receiving great salaries or exceptional retaining fees; public recognition for great services, such as in England have been rewarded with knighthood, is unknown here, and whereas in England the annual *conversazione* of the retiring President of the Institution of Civil Engineers is honored by the presence of royalty itself, together with many of the most eminent men of the nation outside of the engineering profession, who are the notable men other than engineers, who are even invited or expected to attend the annual reception in New York of the American Society of Engineers?

The importance of this high social and professional recognition in England cannot be measured. It means admission to the membership of the Institution of Civil Engineers, without which there is little chance for fees; it means appointments on committees; employment in expert services; Parliamentary services as promoters; and the appointment as engineer to numerous public and private undertaking—all with fees corresponding to the station which the engineers hold socially and professionally. So far as we have any knowledge the emoluments of the profession in England are much more than they are in this country, and that notwithstanding the kingdom is over-crowded with engineers, the Institution having over 4,000 members, to about 300 in the American society.

James McHenry, who, with Lord Bury is now in this country for the purpose of looking after the interests of the English bondholders of the Atlantic & Great Western R. R., is talking very freely about the Erie and its relations to the above road. He charges corruption on the part of the present Erie management, and regrets that he opposed Gould in his attempts to capture the road. The lease, in May last, of the A. & G. W., to the Erie, by the "reorganization trustees" is declared invalid, as these trustees leased what they did not own. He wants a proper and satisfactory account of the $40,000,000 bonded shares lately issued by these trustees, in defiance of the English interests. He says he is here as the largest shareholder in the Atlantic & Great Western, to protect the English bondholders from the results of what they regard as an outrage perpetrated by the Erie road.

The City Council of Philadelphia are considering the advisability of recommending a new form of street car rail, of the English pattern, with grooved top flush with street surface. The street car Presidents claim that such a rail is not adapted for use in our winters, as the groove cannot be kept clear without the use of salt; they thought too that the narrow wheels of light vehicles would wedge in the grooves.

The U. S. Senate Committee on Rules held an important meeting on the 26th ult., the result of which, if approved by the Senate, will materially modify the course of proceedings in that body.

A new committee on "internal improvements" is created, to consist of nine Senators, and to have jurisdiction over all matters relating to improvements of rivers and harbors and of the River and Harbor bill.

To the Committee on Commerce is left the jurisdiction over all subjects relating to commerce, to shipping, to the merchant marine, the life-saving service and light-houses.

A new committee on expenditures of public money is created, to consist of seven Senators, which shall consider such measures tending to economy in public expenditures as shall be referred to it and conduct all investigations into the expenditure of public money which shall be ordered by the Senate unless the Senate shall otherwise direct. This work has usually been done by special committees.

The children of working-men and tradesmen in Paris are so often sent into the country to be nursed, that more than fifty per cent. of the children born in that city die in the baby farmers' hands before reaching their second year. The tradesman whose shop is on the ground-floor, and whose sleeping rooms are on the fourth or fifth floor, could not keep children without losing the services of his wife, whom he needs in his business. If he had children, his wife would be compelled to stay up stairs and take care of them. The case of the workman is similar. A baby farmer charges five dollars a month for the keep of a baby.

There is a limit, they have discovered in California, to the underground water supply penetrated by their artesian wells. There are such numbers of these wells in the Santa Clara Valley as to cause great complaint that millions and millions of gallons are pouring, summer and winter, from the subterranean reservoirs into the sea, so that the water level is rapidly being lowered. In Santa Barbara it is discovered that artesian wells deriving their supply from sources less than 100 ft. deep are falling, while the deeper wells are not affected.

The charming town of Nice is noted for the highness of its death rate and the abundance of its visitors. Works of a gigantic nature have recently been constructed for the supply of water, and the health of the place will doubtless improve, especially since it is intended to purify the river Paillon, which usually presents sewerage, soap-suds, dead animals, and everything but a stream of water. The washer-women of Nice, who are forced to use every stagnant pool formed by the hollows of the river-bed, will have cause to rejoice. And so will the invalids, domestic and foreign.

The methods of practice of English and American engineers are very widely different. Our first sight of a "Civil Engineer," was in 1856, when a large force of English and Canadian engineers and their assistants set up their transit for the first sight on what is now the Eastern Division of the Canadian Pacific Railway. About 100 miles of line were to be located from the St. Lawrence to the Ottawa river, through a level country and with scarcely any engineering difficulties worthy of mention. A very large corps of engineers, in several divisions, were about two years in its location and preparing the estimates; the works were all very simple in character and of the cheapest description; the principal embankment, the especial design of the Chief Engineer was such utterly wretched engineering that it was repudiated in advance by his associate engineers, and with reason, as it broke down under the first traffic over it, resulting in the retirement to private life of the unfortunate engineer, and bringing discredit on his assistants. An American engineer familiar with railway location, with a party of twenty men would have located the whole line in six months and with two assistants in his offic prepared all the estimates in a couple more.

PERSONAL.

WILLIS PHELPS, one of the best known railroad contractors of America, died at his residence in Springfield, Mass., on the 25th ult., at the age of 78. He commenced his career as a railroad builder in 1839, when he took a contract to build six sections of the Western Railroad between Albany and Springfield. This decided his future business career, and he was for 40 years a railroad contractor, it being claimed for him that he was more extensively connected with the construction of railroads than any other man in the United States. He laid the track from Springfield to Hartford, did considerable grading on the Connecticut River road, and built the Milford branch of the Boston & Albany; he built the Council Bluffs & St. Joseph Railroad, raising the funds for its construction; constructed the Rome & Watertown, the Brockville & Ottawa, now the Eastern Division of the Canadian Pacific R. R., the Potsdam and Watertown roads; the Amherst & Belchertown, about 25 miles of the New London Northern, considerable of the Providence & Fishkill and 73 miles of the Terre Haute & Alton. This list is probably incomplete, but it indicates the extent and variety of his operations. Mr. Phelps said of late years, in discussing his business career, that he erred in taking so large a share of bonds and stocks of the roads which he built, in payment for the work done, as the financial burden proved greater than the supervision of their construction had been. But he was able to carry his securities during the financial depression, and finally arranged these affairs in a manner quite satisfactory to himself. MR. PHELPS had other business interests besides railroad building. He was for half a dozen years from 1842 a woollen manufacturer, having one mill at Williamsett, another at Auburn, N. Y., and a third in Connecticut. He was the first president of the Five-cents savings bank, helping to procure a charter for that institution and another for the Pynchon bank, while he was an original tenth owner in the stock of the Fire and Marine insurance company, being a director for many years.

T. WILLIAM HARRIS, Civil Engineer, has opened an office for general professional business at 7 Pearl street, Boston, Mass. MR. HARRIS is an expert in cable street railways and is probably one of the best informed authorities on the subject in this country.

Capt. C. W. ROGERS, Vice-President and General Manager of the St. Louis & San Francisco Railroad, has declined the position of President and General Manager of the New York & New England Road which has been offered him.

Mr. W. R. WOODARD, late superintendent of the Hannibal and St. Jo. R. R. has been appointed General Manager of the Paramore roads in the South-west. Mr. T. L. DUNN, Chief Engineer of the Hannibal and St. Jo. will probably succeed Mr. Woodard, besides retaining his present office.

Capt. R. A. BAYLEY, of Newburyport, Mass., who has been in the warrant division of the Treasury Department for the past fourteen years, died on the 26th. He has written a history of United States loans and was engaged on a statement of the expenditures on river and harbor improvements and public buildings and light-houses.

At a recent election of the Hudson Bay Company the EARL OF DUNRAVEN was chosen Deputy Governor in place of Sir John Rose. The Marquis of Lorne had a majority for Governor, but was declared ineligible.

JAMES J. HILL, President of the St. Paul, Minneappolis and Manitoba Railway Company, registered at the Albemarle Hotel on the 26th.

Mr. L. M. JOHNSON, who during the last three years occupied the position of assistant to the President of the Pullman Palace-Car Company, has been appointed General Manager of the Mexican International Railroad Company, with headquarters at Eagle Pass, Tex., and will assume the duties of his new position at once. Mr. JOHNSON is an able and efficient railroad official and well qualified for the duties of his new and responsible position. He has been in the railroad business for a number of years. In 1874 he went to the Keokuk & Des Moines as engineer, and on account of his efficient services advanced to the respective positions of Chief Engineer, Assistant Superintendent, and Acting General Superintendent. In December, 1877, he accepted the position of General Manager of the Cairo & St. Louis, which he held until Jan. 1, 1881, when he assumed position of the assistant to the President of the Pullman Palace-Car Company. He has since been elected Vice-President of the St. Louis & Cairo, and also President of the Pullman Iron & Steel Company, which office he has offered resign, but his resignation has not been accepted.

DR. W. POLE, F. R. S., Member of the Council of the Institution of Civil Engineers, and for many years Engineer in England for the inspection of Japanese Government railway supplies, has recently received from the Emperor of Japan the decoration of the third class of the Imperial Order of the Rising Sun, or the equivalent of the rank of Knight Commander, the first and second classes being given only to sovereigns and ministers. The order has only once before been conferred on an Englishman, and is therefore considered a very high compliment, not only to its fortunate recipient, but to the Engineering profession in England.

THE salary of Mr. JAMES DEAS, Engineer for the Clyde Navigation Trustees, was raised, last month, from $7,500 to $8,000 per annum.

F. W. SKINNER, Bridge Engineer for the New Jersey Steel and Iron Co., has resigned his position to accept that of Assistant Engineer to the Dominion Bridge Co., Montreal, P. Q.

COL. C. O. SANFORD, one of the oldest civil engineers in the South, died in Petersburg, Va., on Thursday, at the age of 73 years. He was born in New York State in 1811, but had lived in Virginia many years. Under his direction that part of the Norfolk & Western Railroad running from Petersburg to Lynchburg was built. He also supervised the building of the Augusta, Ga., canal and the railroad running from Chatham, Va., now composing part of the Raleigh & Augusta Air Line. In 1856 Col. Sanford was elected Superintendent of the Petersburg & Weldon Railroad, and in 1863 was elected President of the company.

A FINANCIAL star of the first magnitude has passed away in Europe without attracting any attention in this country. Yet no international financial speculation of any importance was for many years past carried on in Europe without the aid and influence of Armand Heine, cousin of the famous poet Heinrich Heine. The family of Heine is a Jewish one, and comes originally from Hanover. But most of its members became thoroughly French in the last two generations. The two brothers, Armand and Michel Heine, were brought up by the famous Solomon Heine of Hamburg, and were sent by him to New Orleans, where they made a large fortune in shipping cotton to Germany and Russia, and where Armand married a rich heiress by the name of Cohen. During the Crimean war the two brothers had large supply contracts for the French army. At the close of the civil war in this country they left New Orleans and joined the banking firm of Fould & Co. of Paris, which was subsequently transformed into the famous firm of Heine, 22 Rue Bergere. Armand Heine leaves one daughter, of about eighteen, said to be worth, in her own right, something like fifteen millions of dollars. She is a fervent Catholic, as is also her mother, the names and origins of both families notwithstanding. The Heines have in the last generation formed by marriage some of the most brilliant alliances. The Princess della Rocca of Naples is a Heine; so are also the Duchesses of Rivoli. The old Mme. Heine-Furtado stands at the head of the list of the French rentes, her income from that source alone being much over a million of francs.—*N. Y. Sun.*

CORRESPONDENCE.

AWARDED PAVING CONTRACT.

Special Correspondence Engineering News.

BALTIMORE, Nov. 26, 1883.

EDITOR ENGINEERING NEWS.—I noticed in your edition of October 27, that in the "News of the Week" you mentioned that the bid of the Maryland Pavement Co., for Cathedral street, was not accepted. Please correct this as the bid was accepted, but the time that was mentioned to finish the contract was changed, and the contract was awarded to us last week. Knowing that you do not wish to misrepresent anything or anybody in your very valuable paper, I have taken this liberty of asking you this favor.

Most respectfully yours,
JOHN COBURN,
Superintendent.

PAPER GAS PIPES.

Special Correspondence Engineering News.

WILMINGTON, N. C., Nov. 23d, 1883.

EDITORS ENGINEERING NEWS:—I am unable to inform your inquirer where "Paper Gas Pipes" may be had, but the following extract from "Iron" (referring to item printed by you), may be of interest as showing the estimation in which they are held in that quarter:

"All this is, of course, very good, but we happen to know that nearly thirty years since an unsuccessful attempt was made to introduce into England, pipes made in a precisely similar manner. For many years we kept samples of these pipes by us, which we eventually cleared out to make room for better things. But history does repeat itself."

Very truly yours,
JOHN C. CHASE.

ATLANTIC & DANVILLE RAILWAY.

Special Correspondence Engineering News.

WAVERLY, VA., Nov. 25th, 1883.

EDITOR ENGINEERING NEWS:—We have laid six miles more of track, this month; have all the grading done through Surrey county, and have 200 men at work in Sussex county, and hope to have the track finished to Waverly, Sussex county, by Christmas; which we are certain of doing if the weather holds.

Please send my paper to Waverly, Sussex Co., Va., after this, for our headquarters have been moved from Claremont to this place. Repectfully,

J. W. ROLLINS, JR., Chf. Eng'r.

MEASUREMENT OF ARCH WORK.

Special Correspondence Engineering News.

CELINA, O., Nov. 20, 1883.

EDITOR ENGINEERING NEWS:—The contract for a certain piece of arch-work states that it shall be paid for "per perch, to be measured in the wall." The arch is semi-circular, 3½ ft. radius. The masons claim pay for a rectangle measured by the extreme width from extrados to extrados, at springing-line, by the extreme height from spring to extrados at crown of arch; and say that such is the custom among masons. Is their any custom fixing the method of estimating the work of masons upon arches, other than the actual number of perches in the arch?

[Cut stone masonry is usually measured by the cubic foot before the stone is laid; where the price is fixed for "arch-work" per perch or cubic yard, the actual cubic contents only are taken. In estimating *work* done upon a wall, it is usual among masons to measure the wall as solid where no opening in it is more than two feet square; but in measuring the amount of material, all openings are deducted. Our columns are open to any correspondent who has further information upon the subject.—ED. ENGINEERING NEWS.]

HAVERHILL, MASS. WATER-WORKS.

Special Correspondence Engineering News.

HAVERHILL, MASS., Nov. 22d, 1883.

EDITOR ENGINEERING NEWS:—As I believe this is the only city in the country that has a special system of water-works, to be used for no other purpose than the extinguishment of fires, I thought that a short description of the works would be acceptable for your columns.

After the great fire of February, 1882, which destroyed the business part of the city, reducing eight acres of business blocks to a shapeless pile of brick, mortar and ashes and entailing a loss of over two millions, it became evident that more water was needed for fire purposes. Quite a spirited discussion was carried on in the local papers, for some time, between the advocates of the system of pumping direct from the river and those who preferred an extension of the present high service supply which is pumped from a lake 110 feet over the river. In the mean time insurance rates took a decided advance and finally work was begun, by the city, on the extension of the high service, on August 16th and finished on the 15th of the present month. About 8,600 feet of 12 in. pipe have been laid with 45 two-way hydrants and two four-way hydrants, at a cost of about $30,000. When the reservoir is full there is a head of over 220 feet on the business streets. If by any accident the pump and reservoir could not be available, there is still a natural head of over 120 feet, from Round Pond. The tests have been very satisfactory. Yours respectfully,

JOHN T. DESMOND.

ELEVATING OUTER RAIL.

Special Correspondence Engineering News.

NEW YORK, Nov. 26, 1883.

EDITORS ENGINEERING NEWS:—In reply to the "Subscriber" who asks the advantage of the English method of getting the total elevation of the outer rail by dividing it between the two rails, elevating one and depressing the other, I beg to remark that the object is to avoid raising the centre of gravity of the cars, and so make the amount of work expended in getting around the curve a minimum.

As to the formula for widening gauge on curves, reference may be made to the "Railroad Engineers Practice" where the equation is recommended:

$$w = \frac{430}{r} - \frac{1}{10}$$

r being in feet and w in inches.

MATTOON, ILLS. WATER-WORKS.

Special Correspondence Engineering News.

KALAMAZOO, MICH., Nov. 23d, 1883.

EDITOR ENGINEERING NEWS:—The City Council of Mattoon, Ills., on Tuesday evening, 20th inst., by a unanimous vote granted a franchise, and entered into contract with A. H. McNeal, of Burlington, New Jersey, for the construction and operation of water-works for said city. The franchise is for the term of twenty years The works are to consist of seven miles of mains, seventy fire hydrants, pumping machinery of two million gallons daily capacity, etc., etc. The city pays $75.00 per year hydrant rental.

S. S. Murphy of Burlington, N. J. and D. C. Cregier of Chicago, represented A. H. McNeal, and W. R. Coats of Kalamazoo, Mich., was the consulting engineer for the city.

ELEVATION OF OUTER RAIL.

Special Correspondence Engineering News.

FERRYSBURG, Mich., Nov. 27th, 1883.

EDITOR ENGINEERING NEWS:—In the last issue of the NEWS a subscriber wishes to know why the difference of elevation of inner and outer rail, around curves, is divided—making the inner rail lower, and the outer rail higher—thereby carrying "the centre of track at grade."

This is done to *keep the centre of gravity of the train at constant height*, and thereby avoid the labor of lifting the whole train through a height equal to half the difference of the level of the two rails.

A train of 15 loaded cars, of say 20 tons each, passing a 12 deg. curve, at 15 miles an hour—the outer rail having an elevation of .154 feet above grade—would meet a resistance of 23 foot-tons, or more than to lift one of the cars, bodily, one foot high.

This saving—or rather avoiding of useless work—is particularly important, for at the passing of curves, other and unavoidable difficulties are met.

The engine must apply its work obliquely to the line of resistance, and thereby lose power in proportion to the *versed sine* of the obliquity. Also, lateral friction of the flanges on the rail is an extra tax on the engine.

By keeping the centre of gravity of the train at *constant height*, we are enabled to get rid of the important one of three evils that otherwise would present themselves simultaneously. H. C. PEARSONS.

LATE NEWS.

THE following notices of intention to ask for charters for incorporation as water companies have been filed in the office of the Secretary of the Commonwealth of Mass. Of John D. Shippen, Moses Joy, Jr. and others as the Holliston Company to supply the town of Holliston; of N. E. Hollis, Geo. D. Willis and others for the purpose of supplying to town of Braintree; of the Everett Spring Water Company for a charter under which it may have a capital of $100,000 which may be increased to $250,000, hold real estate to the value of $80,000 and extend supply pipes into Boston.

A MATERIAL reduction in the working force of the Pittsburg, Fort Wayne & Chicago road has been made in the past week. One hundred men were discharged in the Fort Wayne shops, and one section hand on each section of the entire system has been relieved. Adding to these a large number of men on construction work, the total discharged during the week foot up about 500.

TRACK-LAYING on the Milwaukee and St. Paul branch, from Eau Claire to Chippewa Falls, was commenced last Tuesday under the supervision of J. H. Lakey.

IT is said that arrangements have been made to extend the Illinois Central from Le Mars, via Yankton, to Chamberlain. The survey is already begun.

WORK on the Baltimore & Ohio's new line between Baltimore & Philadelphia is progressing as fast as possible.

THE HISTORY AND STATISTICS OF AMERICAN WATER-WORKS.

BY J. JAMES R. CROES, M. AM. SOC. C. E. M. INST. C. E.

(*Continued from page 556*)

DLXXVI.—PRINCETON, N. J.

Princeton, New Jersey, in lat. 40° 21′ N. long. 74° 40′ W. is on a narrow ridge with nearly level crest, 150 feet above a broad valley on the east, and separated by a ravine on the west from a range of hills. Settled early in the last century, it was selected in 1757 as the seat of the College of New Jersey and the Presbyterian School of Theology.

Water-works were built by a private Company in 1883 after plans of J. J. R. Croes, C. E., and under the superintendence of H. W. B. Phinney, C. E., taking the supply from the ground water in the valley on the East, where a saturated gravel stratum about ten feet thick, overlies sandstone rock and is overlaid by six feet of alluvial deposit through which flows stony rock. A brick well 25 feet in diameter is sunk to the rock and from it the water is pumped by a direct acting Worthen steam pump with fly wheel, through 6000 feet of 10 inch pipe to a plate iron tank 20 feet in diameter and 60 feet high, standing on an iron trestle 60 feet high. The tower was designed by Theodore Cooper, C. E. The top of the tank is 260 feet above the water in the well and 90 feet above the highest ground in the village. On top of the tank a meteorological observatory has been erected by Prof. W. Libbey, Jr. with a special view to the obtaining of unobstructed wind observations.

Distribution is by three miles of cast iron pipe of 10 to 4 inches in diameter, with 31 fire hydrants and 45 taps besides the supply to 26 buildings of the College and Seminary. The village pays $20 per year for each of 23 hydrants. Service pipes are of galvanized iron. The works have cost $55,000. There is no bonded debt. The population in 1880 was 3269. To this must be added about 600 during the College terms. The daily consumption is about 50,000 gallons. Charles E. Green is President and William Libbey, Jr., is Secretary of the Company.

DLXXVII.—WEST POINT, N. Y.

West Point, in lat. 41° 23′ 31″ N. long. 73° 56′ 30″ W. is on a rocky point on the West shore of the Hudson river, 167 feet above the river. It is owned by the United States Government and is the site of the National Military Academy and a Military Post. The Government property comprises 3.28 square miles, most of which was acquired in 1790 and the rest in 1824. The post was first fortified in 1775 and the Academy established in 1802.

Water-works were built in 1879 after plans of Maj. O. H. Ernst and under superintendence of Maj. Raymond and Capt. Taber of the U. S. Corps of Engineers, taking the supply from a small lake of 11 acres area in the mountains, 4 miles from the Post and 1000 feet above the river. The water is passed through a sand and gravel filter 12 feet deep, and drawn from the lake through a siphon of 6 inch cast iron pipe, 900 feet long. The supply pipe is of the same diameter and material and leads to a reservoir 167 feet above the post, built several years ago. No statements of cost or of daily consumption are given. Capt. W. S. Stanton, U. S. Corps of Engineers, is in charge.

THE INVENTOR OF COAL GAS.

The London *Times* says: A project has been started for erecting a public memorial to William Murdock, a man who ought to be ranked among the foremost inventors of this century, but whose genius has as yet never obtained national recognition. Among other things he invented gas. To use his own language, he claimed the first idea of applying and the first actual application of coal gas to economical purposes. He also constructed the first steam locomotive ever used, and the first working models of oscillating and slide valve engines. These curiosities were lately exhibited at the Westminster Aquarium, when a lecture on Murdock's life and inventions was delivered by Mr. M. Macfie, and it is understood that a committee is about to be formed, under the presidency of Sir William Siemens, with the object of getting a statue of Murdock placed on the Thames Embankment, and, further, of converting this inventor's residence at Handsworth, Birmingham into an International Gas Museum. Murdock gave his invention of gas to the world as a free gift without taking out a patent for it, and this is perhaps why the public knows so little of one of its chief benefactors.

William Murdock was born on the 25th o August, 1745, near Auchinleck, in Ayrshire, a parish in which Boswell, Johnson's biographer, owned large property. William's father, John Murdock, a millwright and miller at Bellow, near Old Cummock, designed the first iron-toothed gearing in Great Britain, and a pinion cast from his plans at the Carron Works, Falkirk, in 1745, is still in the possession of his great-grandson, at Gilwern, Abergavenny. William Murdock worked under his father until he was 23; then started for Birmingham, attracted by the fame of his great countryman, James Watt. He went to the Soho Works to ask for employment, and Boulton, the head partner, whose pecuniary help had been the making of Watt, noticed that the lad was twirl-

ing a queer-looking hat between his fingers. It came out that this hat was made of wood, and had been turned by Murdock off a lathe of his own invention. It immediately struck Boulton that a village youth who had discovered by himself the process of oval turning must be a valuable mechanic, and Murdock was forthwith engaged at a salary of 15/ a week. So marked were the talents he displayed that he was not allowed to remain long at Birmingham. A demand for Watt's engines was fast rising in the Cornish mines, and Murdock was sent to superintend the erection and direct the movements of these engines until they were in smooth working condition. He also had to instruct other mechanics, and took these laborious duties so much to heart that he hardly gave himself any rest. Boulton, visiting the mines, described his faithful servant as literally "flying from pit to pit to set the engines right," and it is related that after he had got the first engine at the Wheal Union ready for starting, the people in whose house he lodged at Redruth heard a great noise in the night, and found him in a nightmare hammering at his bedpost and roaring, "Now she goes, lads."

It was in 1784, about five years after he went to Cornwall, that Murdock constructed at Redruth a model of a high-pressure engine to run on wheels. It was about a foot high, the boiler being heated by a spirit lamp. A dark night was chosen for the trial of the machine, on a lonely path leading to the parish church, about half a mile from the town, between high hedges. Murdock lit his lamp, and, before he expected it, off dashed his engine. The village parson happened to be coming down the road, and suddenly meeting the hissing, fiery, headlong thing, the reverend gentleman raised appalling cries, and long afterward talked of the occurrence as having given him the greatest emotion of his life. Unfortunately, after this experiment Murdock's attempt in steam locomotion ceased. On hearing of his success, Watt, who was not always magnanimous, evinced uneasiness, and being in Cornwall at the time, he wrote to Boulton, urging that Murdock should be ordered to desist from his undertaking; but Boulton took another view of the matter, and made an honest proposal to the young Scotchman. He offered him £100 to prosecute his experiments, and promised that if within a year Murdock constructed an engine capable of carrying two persons and the driver, with 200 pounds of luggage, fuel for four hours and water for two hours, the machine to run at the rate of four miles an hour, a partnership should be struck with the proprietors of Soho. Murdock, however, was too much engrossed with his ordinary duties to bestow the proper amount of thought and time to the perfecting of his invention, though he appears to have foreseen all its possibilities and to have been sanguine of succeeding with it some day or other. He continued to superintend the mine engines, and until he was 44 years old his salary amounted to only £1 a week. He then asked for an increase, but, as it was not given, he made up his mind to try and better his fortune and enlarge his experience by returning to Birmingham. Hereupon the mining companies of Cornwall suddenly awoke to a full appreciation of his services, and offered him £1000 a year if he would remain at the mines as chief engineer. He refused, but, on his going to Birmingham, his employers, Boulton & Watt, who had not treated him too generously till then, decided that they must not let him slip, and re-engaged him at £1000 a year to be the general manager of their works. Eventually he was to become a partner in the firm; meanwhile his well-merited promotion bore immediate fruit in all sorts of inventions and improvements which he introduced at the Soho Works.

In preparing specifications for circular motion Watt devised no fewer than five distinct methods of wheels rotating round an axis, but was at last compelled to adopt, as much better than his own, the plan invented by Murdock and shown in the model of the planetary motions contrived by the latter. "It has this singular property," says Watt, "of going twice round for each stroke of the engine, and may be made to go oftener round if required." Another of Murdock's inventions, after he returned to Birmingham, was the boring of cylinders by an endless screw working into a toothed-wheel whose axis carried the cutter-head, instead of by spur gear. In 1785 he invented the first oscillating engine, the system of which is still in use. He improved upon Watt's double engine by introducing the double-D slide-valves in place of the four poppet valves used by Watt, thus economizing steam and insuring simplicity. One more of his striking inventions was a system of casting steam cases for cylinders in one piece, instead of in separate segments bolted together, as previously. To him, again, is due the merit of an ingenious rotary engine, the efficiency of which was proved by the satisfactory manner in which it drove machines in his own private workshop, though he never took pains to bring it into general use. The employment of compressed air having long engaged Murdock's attention, he was able to work a little engine, 12-inch cylinder power and 18-inch stroke, which drove the lathe in the pattern shop on this principle. This contrivance remained in use 35 years.

Murdock again constructed a lift to be worked on the same system, and by this agency he raised and lowered the castings from the boring mill to the canal bank. He utilized the same power to ring the bells at his residence—Sycamore Hill House—an arrangement afterward adopted by Sir Walter Scott at Abbotsford. Murdock next experimented on the power of high-pressure steam in propelling shot, and in 1803 invented a steam gun, with which he made many trials at Soho, thus anticipating Perkins' apparatus. The now celebrated cast-iron cement was soon afterward evolved from his ever-busy brain. Finding that some iron borings and sal ammoniac had got mixed in his tool-chest and rusted his saw-blade nearly through, he was led to mix these ingredients in various proportions, till at length he composed the cement which afterward became an article of such extensive manufacture at the Soho Works, and completely superseded the cement invented by Watt.

In 1815 Murdock invented an apparatus for heating water for the baths at Leamington by the circulation of water through pipes in a boiler—a method widely adopted since for heating buildings and conservatories all over the world. In 1816 he had patented an invention for boring stone for water, and for cutting columns out of solid blocks by one operation, and Murdock's claims to be considered one of the greatest discoverers in practical science might be securely based on the inventions just enumerated; but the man's mind was never idle, and his investigations were pursued daily and hourly in every direction. He made a variety of machines for grinding peat-moss into a fine powder then consolidating it under immense pressure so that it would take the most brilliant polish and become a substitute for jet. He was next exercised by schemes for utilizing what he regarded as an enormous waste of power—the tread of men and horses in the streets; but nothing came of these musings, which will, perhaps, be turned to better account by some other man of science. To William Murdock, however, undoubtedly belongs the invention of the first atmospheric railway; at least his experiments with an exhausted air tube as a mode of transit, put his pupil, Samuel Clegg, in the way of perfecting this discovery. Though the railway was abandoned, Murdock's original idea of an exhausted air tube for sending letters and parcels was adopted and satisfactorily carried out by the well known Pneumatic Dispatch Company.

But William Murdock's work as a gas inventor must remain as a most conspicuous achievment. Notice was first drawn to carbureted hydrogen in this country by Thomas Shirley, who conducted some crude experiments near Wigan in 1669. He found that the elastic fluid escaping from a well in his neighborhood could be easily ignited. A paper was communicated by Shirely to the Royal Society, and was printed in the "Philosophical Transactions" of June, 1667, at about the same time that a Fleming, Van Helmont, distilled coal and called the product "gas." The next reference to gas was heard in 1733, when Sir J. Lowther reported some investigations he made into the properties of this "vapor." In 1738 a letter was addressed by Dean Clayton, of Kildare, to the Hon. Robert Boyle, stating that prior to 1691 he had distilled coal in a retort and stored up the gas in a bladder. Stephen Hale went further, and in 1787 Lord Dundonald lit up Culross Abbey with his patented process for obtaining coal tar. Dr. Watson, Bishop of Llandaff, was another of the early experimenters on gas; he conveyed the air from pit coal through some yards of glass, and observed that after passing through water it remained inflammable and burned with a purer light. A German named Diller exhibited in 1788, at the Lyceum, Strand, what he called "philosophical fireworks," produced by inflammable gas; but none of these pioneers in the development of gas for practical lighting regarded it otherwise than as a scientific toy. It was not until Murdock, while employed at Redruth, had applied himself to the distillation of gas that the possibility of using it on a large scale with profitable commercial results was dreamed of.

In 1793 he lighted his office and cottage with gas to the great wonder of the miners, whose belief in his powers took an almost superstitious turn from this moment. His experiments, however, had to be abandoned, for five years, —though he used gas in his own cottage all this while—and in 1797, when he renewed his researches, he advised Watt to take out a patent for the invention, but Watt was in pecuniary difficulties just then and declined. Nothing daunted, Murdock in the following year constructed at Birmingham an aparatus for the making, storing and purifying of gas, with a view to the supply of factories. At the same time he devised some remedies against the offensive gaseous effluvia. Not long after this the offices at Soho were lighted with gas, and the first public exhibition of the new illuminant was made in 1802, when the exterior of the factory was lighted up in honor of the Peace of Amiens. Curiously enough, on this very same occasion the Frenchman, Le Bon, who knew nothing of Murdock, was illuminating his house in Paris with gas distilled from wood. Watt's son, who was in France at this time, heard of Le Bon's invention, and wrote at once to say that if any profit was to be made out of Murdock's invention the patent ought to be taken out at once. But there was no favorable response to this from James Watt, and Murdock, to his eternal honor, let the world have his invention for nothing. Having supplied Soho throughout with gas-burners, he contracted in 1805 with Messrs. Phillips & Lee, of Salford, and lit up their factory like his own. The coal used for this purpose was distilled in large retorts. As it rose from these it was conveyed by iron pipes into larger reservoirs, where it was washed and purified previous to being transmitted through mains to the mills. The burners employed were of two kinds—the one an Argand, the other a small curved tube with a conical end, having three circular apertures $\frac{1}{20}$ inch in diameter. Owing to the shape given to the jet, the workmen called this light the cockspur, and the name has remained. The economy of the new light was proved by the fact that the consumption of gas with 271 Argands and 633 other burners cost £600, against £2000 for candles of the same aggregate illuminating power.

American Society of Civil Engineers.

NOVEMBER 21, 1883.

The Society met at 8 P. M. Director Geo. S. Greene, Jr. in the chair; John Bogart, Secretary.

A paper by S. H. Keating, M. Am. Soc. C. E., upon the Shubenacadie Canal was read.

This canal is located between the City of Halifax, Nova Scotia, and the Basin of Mines, an arm of the Bay of Fundy. It was commenced in 1826, and the intention was to build it so as to accommodate vessels drawing 8 feet of water, with the idea that at comparatively small additional expense, it could be used by vessels drawing 11 feet. It was to have 95 locks, 87 feet in length and 22½ feet in width, with a lockage ascending from Halifax of 25 feet 10 inches, and, decending to the Bay of Fundy, of 15 feet 4 inches. The total length is about 54 miles, the greater portion of which was to be in the Shubenacadie River, and in a chain of lakes existing along the line of the canal.

Mr. Thomas Telford, the celebrated engineer, made a very favorable report upon the proposed canal and its prospects. Up to the close of 1831, £72,000 had been expended upon the work, which was, however, in an entirely uncompleted state. Some of the locks near Halifax had not been commenced and larger and expensive work remained to be done upon the line of the canal. All the available capital being exhausted the works were abandoned, and fell into ruin, never having been completed on the original plan. In 1856, a report was made by Mr. W. H. Talcott, C. E. upon a scheme for completing the works upon a very much smaller scale than at first proposed, substituting for certain of the locks, an inclined plane near Halifax, with a lift of 55 feet, and a similar plane with a lift of 33 feet at another point. The planes to be worked by hydraulic machinery. This report was adopted and the work was completed in 1862, at a cost of $200,000. The diminished canal has, however, proved a failure as a commercial enterprise, and since 1870 no trade of any account has been carried on through it.

There was also presented a description by Charles C. Smith, M. Am. Soc. C. E., of a Hydraulic Canal built at Minneapolis, Minn., during the severely cold winter of 1881. This Canal is under Main Street, Minneapolis, its entrance being at right angles to the streets. It is covered with a semi-circle rubble stone arch of 17½ ft. span, and where the line turns the angle of 90° the abutments of the arch were built of curved lines of the radius of 31½ and 48¾ feet. The arch was built of rubble masonry of stone, varying from 4 to 6 inches thick, and from 18 to 36 inches long; the joints at the soffit being slightly hammered off to approximately form beds conforming to the radial lines of the arch. The mortar was made of one part Louisville cement to two parts of sand, and was mixed in hot water without salt. During its construction the weather was extremely cold, the frost having penetrated the ground to the depth of six feet. An examination of this work having been made quite recently, it was found to be perfectly sound and free from any indication of settlement or rupture two years after its construction.

A discussion followed by the members present, more particularly in reference to the best methods of laying masonry in very cold weather, the experience of a number of members present being favorable to the use of a strong solution of salt in the water with which the mortar was made.

The recent adoption of a system of time standards by the Railways was discussed, and Prof. Julius E. Hilgard, M. Am. Soc. S. E., gave a statement as to the measures which were in progress in reference to securing a standard prime meridian, together with other measures pertaining to the determination of Standard time by the various nations of the world.

He also described the results of the recent meeting at Rome, Italy, of the superintendents of the geodetic surveys of various nations.

Improved Rapid Method of Copying Drawings, Manuscripts, Etc.

The common method of copying drawings by contact with the blue process or sensitive silver paper, which requires an exposure to the sun of from fifteen minutes to half an hour, seems likely to be superseded to some extent by the introduction of improved gelatine bromide of silver paper.

Gelatine sensitive paper has been difficult to prepare, but by means of recent improvements, the manufacturers are now able to furnish it in large sheets, uniformly coated, so that its use in various branches of the arts promises to be extensive.

Architects, draughtsmen, engineers and others who wish to make duplicate copies of their drawings are, by the usual process, obliged to make a tracing upon transparent linen cloth, so that the light may easily affect the sensitive paper. Much extra time is lost and expense incurred. By means of the gelatine sensitive paper any ordinary thick card board drawing can be copied in a few seconds, either by diffused day light or gas or lamp light. The copy will be an exact reproduction of the original, showing the letters or figures non-reversed.

If it is desired to make a copy in the day time, any dark closet will answer, where all white light is excluded. The tools required are an ordinary photograph printing frame and a red lantern or lamp.

The sensitive gelatine paper is cut to the size required, and laid with the sensative side upward upon the face of the drawing, and pressed thereon in the usual manner by springs at the back of the frame, which is then carried to the window and exposed with the glass side outward from two to five seconds to the light; the exposure varying according to the thickness of the drawing. If gas or lamp light is used at night, from 20 to 30 minutes' exposure is sufficient.

The frame is returned to the dark closet, the exposed sheet is removed to a dark box, and other duplicates of the drawing can be made in the same way. It is thus possible to make from ten to twenty copies of one thick drawing in the same time that it usually takes to obtain one copy of a transparent tracing by the ordinary blue process.

The treatment of the exposed sheets is quite simple; all that is necessary is to provide from three to four large pans or a large sink divided into partitions. The development of the exposed sheets can be carried on at night or at any convenient time, but a red light only must be used. The paper is first passed through a dish or pan of water, and then immersed in a a solution, face upward, composed of eight parts of a saturated solution of oxalate of potash to one part of a saturated solution of sulphide of iron, enough to cover the face of the paper. Both chemicals are easily obtained at a druggist's. The latent image soon appears, and a beautiful copy of the drawing is obtained, black where the original was white, with clear white lines to represent the white lines of the drawing. With one solution from six to eight copies can be developed one right after the other. After development the print is dipped in a dish of clear water for a minute, and finally immersed for three minutes in the final or fixing solution, composed of one part of hyposulphate of soda dissolved in six parts of water. It is then removed to a last dish of water face downward, soaked for a few minutes, then hung up to dry; when dry it is ready for use. Instead of drawing, manuscript can be placed in the printing frame and exposed as described. All the water marks or peculiarities of the grain of the paper will be faithfully reproduced. The advantages of this process are self-evident.

Intricate mechanical drawings can be so rapidly copied, that working copies can be quickly delivered. By this process, original manuscripts, certificates and documents of every kind can be rapidly copied, every detail being brought out, the original paper serving as the negative, the copy being of the exact size as the original.—*Scientific American.*

Railway Shareholders' Association

THE Railway Shareholders' Association was incorporated at Albany, Nov. 24. The object of the association is the receiving, obtaining, collecting, and accumulating of items, matters of news and facts regarding railroad corporations, undertakings, systems, construction, investments, management, taxation, legislation, judicial decisions, etc., and supplying, selling, vending, and furnishing the same in newspapers, pamphlets, or such other forms as shall be deemed expedient for the promotion of the stability and for the augumentation of the values of railroad shares and securities. The capital is $100,000. The trustees are C. P. Huntingdon, Sydney Dillon, John Livingston, Horace Porter and William Hall, of New York, George R. Roberts and Franklin B. Gowen of Philadelphia, William B. Strong of Boston, Alexander Mitchell of Milwaukee, William K. Ackerman and Albert Keep of Chicago, William G. Raoul of Savannah, and Charles C. Haines of Brooklyn. Operations are to be carried on in the United States, Mexico, Canada, and other parts of the American continent and Great Britain and all British possessions.

THE *Sun* says, editorially: "Mr. C. P. Huntingdon, Mr. Sidney Dillon, and others, have formed a Railway Shareholders' Association for the purpose of collecting and selling to newspapers, and disseminating in various manners, news about railroads. The main object of the new association seems to be to have the facts about railroads presented in such a rosy or gloomy light as may best subserve the interests of wealthy shareholders and speculators. News from such a source will, we are afraid, be received with a very considerable grain of salt by the public, which looks to the newspapers for its facts, and the newspapers are able to collect the news about railroad withouts the aid of an association of railroad magnates who have stocks to manipulate."

FOR the purpose of applying the commercial agency system to the railroads, an organization has been incorporated at Albany, N. Y., which is to be known as the "Railway Shareholders' Association." It proposes to collect and disseminate to its subscribers all facts affecting the stability of railroad securities exactly as is now done in mercantile business. —*Chicago Tribune.*

IN referrence to the organization of the "Railway Shareholders' Association." Gen. Horace Porter states that the use of his name as a Trustee, in the articles of incorporation was without his consent or knowledge, and, that as soon as he learned of it he sent a communication forbidding the use of his name in connection therewith.

PHILADELPHIA, Nov. 27.—A prominent officer of the Pennsylvania Railroad Company, upon being interrogated to-day as to the object to be attained by the Railway Shareholders' Association, which according to a recent dispatch has been chartered at Albany, stated that neither President George B. Roberts nor Director A. J. Cassatt, whose names are mentioned in connection with the scheme, knew anything whatever of the enterprise, that the road is in no way interested in it, and that the names of Pennsylvania Railroad officers have been used entirely without authority in connection with the organization.

TO THE EDITOR OF THE *Sun*—*Sir:* Will you kindly do me the favor to say that my name has been used as a trustee of the Railway Shareholderss' Association without my knowledge or consent? I know nothing whatever of the Railway Shareholders' Association or its objects. I shall have nothing whatever to do with it, and shall certainly advise my friends to be extremely cautious in dealing with any association in which the promoters have used my name as an officer without authority.

Very respectfully, FRANKLIN B. GOWEN.

NEW YORK, NOV. 27.

Water-Proofing.

Porous goods are made water-proof by two very distinct systems. According to the first, the articles are made absolutely impervious to water and air by having their pores filled up with some oily or gummy substance, which becomes stiff and impenetrable. Caoutchouc, paints, oils, melted wax, etc., are of this kind. The other system consists in making the fabric repellant to water, while it remains quite porous and freely admits the passage of air. Goods so prepared will resist any ordinary rain, and we have seen a very porous fabric stretched over the mouth of a vessel and resist the passage of water one or two inches deep. The following recipes, says an exchange, have been tried and found good. Most of those found in the recipe books are worthless.

To Render Leather Water-proof.—1. Melt together 2 ounces of Burgundy pitch, 2 ounces of soft wax, 2 ounces of turpentine and one pint of raw linseed oil. Lay on with a brush while warm.

2. Melt 3 ounces of hard lard and add 1 ounce of powdered rosin. This mixture remains soft at ordinary temperatures, and is an excellent application for leather.

Water-proof Canvas for Covering Carts, etc.—One pound of litharge, 9½ gallons of linseed oil, 1 pound of umber, boiled together for 24 hours. May be colored with any paint. Lay on with a brush.

To Make Sail Cloth Impervious to Water and yet Pliant and Durable.—Grind 6 pounds English ocher with boiled oil, and add 1 pound of black paint, which mixture forms an indifferent black. An ounce of yellow soap, dissolved in half a pint of water, is mixed while hot with the paint. This composition is laid upon dry canvas as stiff as can conveniently be done with the brush. Two days after, a second coat of ocher and black paint (without any soap) is laid on, and, allowing this coat time to dry, the canvas is finished with a coat of any desired color. After three days it does not stick together when folded up. This is the formula used in the British navy yards, and it has given excellent results. We have seen a portable boat made of canvas prepared in this way and stretched on a skeleton frame.

Metallic Soap for Canvas.—The following is highly recommended as a cheap and simple process for coating canvas for wagon tops, tents, awnings, etc. It renders it impermeable to moisture, without making it stiff and likely to break. Soft soap is to be dissolved in hot water, and a solution of sulphate of iron added. The sulphuric acid combines with the potash of the soap, and the oxide of iron is precipitated with the fatty acid as insoluble iron soap. This is washed and dried, and mixed with linseed oil. The soap prevents the oil from getting hard and cracking, and at the same time water has no effect on it.

The following recipes are intended to be applied to woven fabrics, which they leave quite pervious to air, but capable of resisting water.

1. Apply a strong solution of soap, not mere soap suds, to the wrong side of the cloth, and when dry wash the other side with a solution of alum.

2. The following recipe is substantially the same as the preceding, but if carefully followed in its details gives better results:

Take the material successively through baths of sulphate of alumina, of soap and water; then dry and smother or calender. For the alumina bath, use the ordinary neutral sulphate of alumina of commerce (concentrated alum cake), dissolving 1 part in 10 of water, which is easily done without the application of heat. The soap is best prepared in this manner: Boil 1 part of light resin, 1 part of soda crystals and 10 of water, till the resin is dissolved; salt the soap out by the addition of one-third of common salt; dissolve the soap with an equal amount of good palm-oil soap (navy soap) in 30 parts of water. The soap bath should be kept hot while the goods are passing through it. It is best to have three vats alongside of each other, and by special arrangement to keep the goods down in the baths. Special care should be taken to have the fabric thoroughly soaked in the alumina bath.

3. Drs. Hager and Jacobson remark that during the last few years very good and cheap water-proof goods of this description have been manufactured in Berlin, which they believe is effected by steeping them first in a bath of sulphate of alumna and of copper, and then into one of water-glass and rosin soap.

The Canal from St. Petersburg to Cronstadt.

The means of communication between St. Petersburg and Cronstadt are a matter of extreme importance to Russian commerce; since all goods from the interior of the empire intended for exportation, are brought to the capital during the fine season, by rail and canal, transhipped into special barges, conveyed by the present narrow canal to Cronstadt, and there reshipped for sea transport. The converse is the case with imported goods for the north of Russia, and much expense and delay is the result. Communication is at present carried on by means of a narrow and sinuous canal, which crosses the vast Delta of the Neva. Its depth is variable, the minimum being 9 ft. 6 in., and it is of course injuriously affected by the floods to which the basin of the Neva is so liable, when the river is full, and a strong westerly or northwesterly wind blows back its waters. It was therefore decided to construct another and larger canal, in a new line, instead of attempting to enlarge the old one; and in the year 1876 the works were commenced, and are now about two-thirds complete. The canal starts from the mouth of the Neva, where it will open into a large basin, and proceeds southwards for nearly two miles. In this part of its course, it will have a navigable width of 207 ft., and will be carefully embanked. Taking a wide curve, it will then join the canal which goes direct to Cronstadt; and from the same point a branch will proceed to meet the Neva above St. Petersburg. It will have a uniform depth of 22 ft. The soil is easy to work, consisting almost entirely of clay, sand, and gravel, and a total quantity of 47,737,000 cubic yards of ballast has been extracted, being about two-thirds of the whole. The remainder will be excavated by the end of next year. This material has been used in constructing the extensive embankments required. The foundations of the embankments were laid with a double row of timber pontoons filled with gravel; their internal faces were then covered with planking, and plastered with clay. The space thus formed and lined was filled with liquid mud by Burtland Freeman's mud-pumping apparatus, and the contained water was allowed to escape by openings provided for the purpose. The sloping sides of the dyke are protected only by unmortared masonry, resting on a bed of ballast. No provision has been made against sand. The dredgers employed were all English, except two small ones made at St. Petersburg, and one in Belgium; they number altogether ten, and are capable of excavating a total of 188,354 cubic yards in ten hours' work. Eighty-six barges and lighters are also in use, capable of transporting 153,038 cubic yards; twelve tugs, of a total force of 600 horse power; one steam-boat and two steam-launches, for purposes of inspection; two floating dredges, one Gabert excavator, and seven locomotives with a centrifugal Neut & Dumont exhausting pump. Any deficiencies in this plant are supplied by hiring.

CAPE COD CANAL.

The significance of the application last Thursday by Alfred D. Fox for a charter to construct a ship canal across Cape Cod is just made public. Fox is contractor for the "Cape Cod ship canal company" now at work in Sandwich, Fox, it is alleged, did not fulfil the conditions of the charter and the company made another contract with Frederick K. Lockwood to build a canal, believing Fox was working against their interests. The company profess that Fox is the tool of the Old Colony railroad which they say will do its utmost to prevent the construction of the canal. On the other hand, it is claimed the company has not fulfilled the conditions of its charter and that consequently it is no company at all. Mr. Fox's attorney coincides in the opinion that the canal company has forfeited its charter. Mr. Fox he says, had a contract with the company, which was violated by the latter, and the company secretly let the contract to Lockwood, who was sub-contractor under Fox. Fox represents capitalists in Boston and New York, and would, have fulfilled his agreement in good faith had the company not prevented him. The Old Colony railroad, the attorney says, is in no wise interested in Fox's plans, and Fox will proceed to construct the canal, without regard to Lockwood or the parties associated with him if he secures the charter asked for.—*Springfield Republican.*

BOSTON, Nov. 27.—At the annual meeting of the Old Colony Railroad to-day the Old Board of Directors was unianimously re-elected, as was also President Choates and Vice-President Ames.

President Choates has made a statement in regard to the connection of the roads interested with the proposed Cape Cod Canal. There was, he said, but one stockholder in the concern, and he appoints an engineer who does as he pleases. It is doubtful if there is a corporation at all. At least it is not a very satisfactory corporation to deal with. But so far as the old Colony Railway was concerned Mr. Choates did not see that it would be in the slightest degree affected by the successful completion of the canal. The first legal obstacle to a continuance of work on the Cape Cod Ship Canal was interposed by Judge Holmes in Boston, Nov. 23rd, by the issuance of an order of notice for the respondents to show cause in the equity suit of Jeremiah Briggs and others, of Barnstable, why the prayer of the plaintiffs, to restrain the defendants from taking their land in the construction of the canal, should not be granted. The plaintiffs alleged that the defendant company has not complied with the provisions of the statutes authorizing its existence; that it has exceeded its authority, and that its capital stock has not all been paid in.

AN effort is again being made in St. Louis to obtain a license from the City Council for an elevated railway upon the plan of those now in use in New York. The road will connect the business centre of the city with its extreme northern and southern limits and with Forest Park on the west.

DURING the past ten years the expenditure per train mile of English railways has remained at about the same level. Between 1872 and 1882 there have been some fluctuations, but in 1872 their expenditures per train mile, including maintenance of way, motive power, repairs, &c., were 32.27 pence, and in 1882 they were 32.47 pence.

Col. Flad's Opinion of the Saddler Brick Pavements for Streets.

Col. Flad having been editorially taken to task by the *Globe-Democrat* of St. Louis, and charged with his associates with having given less consideration to the application of the Saddler brick to street paving than its demonstrated value would warrant, answers in effect as follows:

That the board had always acknowledged the good points of the pavement in question, but were also bound by duty, to state those in which it failed. The bricks heretofore laid down show but little abrasion on the upper surface, although subject to heavy traffic; they are impervious to moisture and are not effected by frost, and have the great advantage over blocks of stone, of being readily molded into any desirable form. They might be shaped so as to leave a joint wide enough at the surface to give sufficient foothold for horses, and still be laid closely together at the bottom; and if the joints were filled with a mixture of bitumen and sand; the whole roadbed could be made impermeable to water. A pavement of this kind would, moreover, be more readily cleaned than most of the others. On the other hand, the bricks heretofore brought to the attention of the board have all shown more or less brittleness, which caused their edges to chip and many of them to break. This is a defect which, in the opinion of the board, would greatly reduce the life of the pavement.

The board can not, therefore, join in the belief, expressed by Mr. Saddler and his friends, that the value of this pavement has been demonstrated, until they have succeeded in producing bricks of uniform quality and free from brittleness.

Personally, I have always believed that the defect above mentioned could be prevented by careful burning in properly constructed kilns and by thorough annealing, and have encouraged Mr. Saddler and his associates to continue their experiments, with a view of overcoming the existing difficulty. But whether the result can be reached, and, if so, whether the cost of attaining it will not raise the price of this pavement too high, is an open question, which time only will develop.

The Uses of Ammonia.

More than fifty patents for the making fo ammonia have been taken out within the last two years in England, America, Belgium, France, Austria and Germany. Many of the schemes have been patented in all the countries at once. The patents apply to gas works, oil works, blast furnaces, alaki works, and sewage works. Ammonia seems to share with electricity the present attention of the patentee world.

OBITUARY.

ARTHUR SPEILMANN, C. E., died on the morning of Nov. 29th, at his residence in Jersey City. Mr. Spielmann was born about 1846; graduated at the University of New York in 1867, and for the last ten years has been Professor of Civil Engineering in that institution. As a member of the firm of Speilmann & Brush, Civil Engineers, he has been indentified with nearly all the late public improvements of Hudson Co.; among other engagements, they were for a time Engineers for the Hudson River Tunnel. Mr. Speilmann made several translations of engineering works from the German for the use of students.

NEWS OF THE WEEK.

DIVERS employed at the Severn Tunnel works have succeeded in reaching and closing an iron door, shutting off the flow of water from the spring which inundated the completed portion of the tunnel. The effect was at once apparent, as the pumps, instead of reducing the water only at the rate of 4½ in. per hour, gained upon it at the rate of 2 ft. per hour. Difficulties with the recently flooded section are thus regarded as virtually at an end.

THE Warmaton, Kan., iron bridge, just completed by the Mt. Vernon Bridge Co., has been accepted by the County Commissioners of Fort Scott county, Kan.

A LETTER from Charlemont, (Mass.) says: Although the Davis mine in the neighboring town of Rowe has been worked but little over a year, its success has attracted the notice of mineralogists and capitalists, several of whom have bought or leased land in this vicinity, on which to begin operations on their own account. The first of these new companies to sink a shaft is Sears & Crowell of Boston, who has bought a 200-acre pasture lot. The work thus far has not been so much to find good specimens of the pyrites as to clear out the rock for efficient and profitable work during cold weather. Incidentally, however, several good pieces of pure ore have been found, and the indications are that a rich deposit of pyrites will soon be struck. As soon as this is assured, improved machinery will be put in for mining. Another company formed for mining pyrites is composed of a number of Baltimore men who have bought a tract of 75 acres in Charlemont and take a "miner's lease" of a farm in Rowe. Active operations will not begin until spring, but then the opening of the mine will be rapidly pushed. It is the intention of the company to ship their ore to New Haven and thence by empty coal-boats to Baltimore.

THE Rush Bridge, Chicago, will probably be a wooden structure, to cost some $15,000.

THE Rush street bridge over the Chicago river cannot be repaired, and it will be necessary to erect a new structure. The City Engineer prepared estimates to be submitted to the Council last Monday night. Estimates will be presented for a wooden, an iron, and a double-track bridge, the choice to be left with the Council.

A REPORTER who interviewed a number of householders on Pine street, found a general feeling in favor of the asphaltum pavement although some complained loudly of both the noise and dust.

IT IS estimated that the damage to the bridges and other property in Randolph county, Ill,, by the late storm, will reach $100,000.

THE experience of the past season has taught the steamboatmen in the Upper Mississippi that the shutting off of a chute may benefit the river for awhile, but, in order that the improvements may become permanent, the Government must not fail to keep the repairs up. Experience has also demonstrated that, in confining the channel to certain limits, sometimes, and under certain conditions, it makes the channel worse in some other place, which, by extending the Government appropriations, the engineers in charge could repair. However the steamboatmen can not but feel satisfied with the work done on the river, and they will unite in one request that the necessary money for continuing the work may come.

THE ST. LOUIS New Custom House Sub-Treasury Vaults have been accepted from the contractor, Mr. Damson, of Boston.

THE Federal building at Leavenworth will soon be begun as a site has now been acquired.

THE electric light globes at the Hartford opera-house have been tinted a light yellow, and the light is much more agreeable.

Water, Gas and Steam.

A WATER FAMINE threatens Malden, Mass., and there is talk of spending $15,000 to increase the supply.

THE Wellesley, Mass., authorities are talking about taking water from the Charles River at Newton Lower Falls.

LEXINGTON, KY., is to have water works after the plans of J. D. Cook, Hydraulic Engineer, of Toledo, O.

THE OMAHA (Neb.) Water Works Co. have lately ordered of the Knowles Steam Pump Works, of New York, a pumping engine of five millions gallons daily capacity. This pumping engine will be of the compound-condensing-duplex design, of Knowles' improved construction, and will take the place of some pumping engines that have not proved powerful enough for the very exacting duty required in this water-works. The pressure which this new pumping engine will have to work against will be equal to a head of nearly four hundred feet elevation.

MESSRS. SMITH, VAILE & Co., Dayton, manufacturers of steam pumps and hydraulic machinery, report trade good. They have been running until 10 o'clock up to the 1st inst., employing 130 men. They have just made the following shipments: one set of machinery for the Ionia (Mich.) Water-Works of 2,000,000 gallons capacity, per diem, and one set of the Parsons (Kan.) Water-Works, with a capacity for pumping 1,000,000 gallons per diem.

COCHITUATE water is so bad that Boston people buy from 600 to 800 barrels a week of the spring water which is brought into the city and carted about from house to house, and pay not less than 10 cents a gallon for it. The first-class hotels and restaurants use spring water exclusively. The Sharon water company will ask the next Legislature to give it power to run pipes into the city and supply drinking and cooking water exclusively, and to increase its capital stock to $100,000. The company takes its water from Sharon springs, 185 feet higher than Back-bay, which yield 1,600,000 gallons a day.

SOME citizens of the town of Amherst, Mass., have been reading sections 15, 16 and 17 of chapter 110, Public Statutes, which gives cities and towns the privilege of drawing from the pipes of any water company, free of expense, as much water as is necessary when a building is on fire therein, if such conductors are so secured that the water shall not be drawn except for the purpose of extinguishing fires; and which also gives the selectmen the power to make all necessary connections between water mains and hydrants, if the company refuse to do it, at the cost of the town. And now they are wondering how it is that the town voted to pay the water company $1000 per year for 10 years for water for fire purposes, if the law allows the selectmen to take water free of expense from the pipes of an aqueduct corporation which has laid its pipes in the streets of the town.

SEVERAL merchants at Westfield, Mass., are considering the project of putting a new-fangled lighting apparatus into their stores to take the place of gas. The new light is made by combining a kerosine flame with oxygen, forced by water pressure on a carbon tip. One place of business has put in the light, and it proves far superior to gas in softness, clearness and brilliancy, much resembling an electric light.

SEVERAL thousand dollars is being spent on the water supply in surveying in Clarksburg, Mass., for a new reservoir, and in experimenting on artesian wells.

Business and Labor.

MESSRS. DOBIE & Co., ship-builders at Govan, a suburb of Glasgow city, have failed. Twelve hundred workmen are thrown out of employment by the failure.

CLEVELAND, Nov. 27.—There is 40 per cent. less iron ore in sight here than has been usual at this season in 12 years. The iron-owners have brought down only such ore as they could place. The report that the Delaware, Lackawana and Western Road sold rails from their mills yesterday at $33.50, which is $4.50 less than the tariff used to be when rails were selling at $80, served to still further darken the outlook. Sixty-seven furnaces have gone out of blast, and the production of pig-iron hardly equals the daily consumption. In view of these facts, many iron men here predict an iron famine before Spring.

THE Chicago ship-yards have reduced working time of their employes from ten to eight hours per day. Wages have also been cut down from $2.75 to $2.25.

BOSTON, Nov. 26.—The Chelsea Iron Foundry Company has suspended payment. Its liabilities are not stated.

CHATTANOOGA, Nov. 26.—The firms of S. B. Lowe and Lowe & Kirk made assignments today. Lowe & Kirk were in the foundry and machine business and S. B. Lowe was a manufacturer of metallic paints. The aggregate assets are $60,000 and the liabilities less than $50,000. The Lowe Metallic Paint Company is not affected.

BOSTON, Nov. 26.—George W. Townsend, a submarine contractor of Boston, has gone into insolvency. He owes about $14,000. His assets for unsecured creditors are of little value.

PITTSBURGH, Nov. 21.— The Mills of Wilson, Walker & Co., Miller, Metcalf & Parkin, and the 8-inch department of Clark & Co., closed down to-night on account of lack of orders. Singer, Nimick & Co., have arranged to put men on half time.

CALIEMTE, Cal., Nov. 25.—The hoisting works of the Sumner Mining Company were burned yesterday. The loss is estimated at $750,000.

FOUR hundred miners in Gamble & Risher's mines, near Pittsburg, struck on Tuesday evening against a reduction of a quarter of a cent per bushel in the mining rate.

TRAFFIC at New Orleans is greatly embarrassed by the strike of the railroad freight handlers. The strikers ask no increase of wages but ask that only union men be employed.

HARRISBURG, Penn., Nov. 26.—Bailey's large plate mill, in the lower part of the city, has shut down, and about 150 men are thrown out of employment. The step was contemplated for some time and is owing entirely to a scarcity of orders. It is impossible to state how long the stoppage will continue, although it is thought by many of the workmen that it will last for a few days only. Gentlemen connected with the works state that as soon as sufficient orders are obtained the works will resume operation. There is no truth in the report that the steel works have shut down.

PITTSBURG, Nov. 25.—The extensive glass factory of Thomas Evans & Co., on the south side was burned this morning. The loss is $90,000, on which there is $40,000 insurance. The fire started in the blacksmith shop, but its origin is unknown. The factory was the most extensive and complete of its kind in the United States.

SAN FRANCISCO, Nov. 26.—The Holmes Mining Company has obtained a judgment of $360,000 against the Northern Belle Mining Company for tresspass. The stock of the latter company dropped 50 per cent. to-day.

TROY, Nov. 27.—A mill of the Schaghticoke Powder Company, near Valley Falls, N. Y., was destroyed this afternoon by the explosion of four barrels of powder. No one was injured.

CINCINNATI capitalists have called a meeting for yesterday to organize a stock company, with $500,000 capital, to establish a mammoth cotton mill.

THE wages of employes of the Trenton, N. J., Iron Works will be reduced 10 per cent. on the 8th of December. The reduction effects only those receiving at the present time $1.25 or upwards a day.

Railroads.

A NEW LINE from Logansport, Ind. to Wheeling, W. Va., is projected. It will open up rich coal mines in Stocton county, Ohio.

TWENTY MILES of road is being built in North Carolina, between Asheville and Hendersonville. This will enable the East Tennessee to run from Chicago to Charleston Harbor.

WORK ON the South Penn'a Railroad is being bid for with a vengeance; 300 contractors have put in an appearance and 246 proposals have been received, an average of about sixty-three bidders for each mile. O'Brien & Rogers have broken ground on the approaches to the Sideling Hill Tunnel, the longest tunnel on the line, and have a fair force at work.

ON A RECENT excursion over the New Orleans & Northeastern R. R., the train in going north, ran the 25 miles of trestle work across Lake Pontchartram in 43 minutes, and on the return ran at the rate of 50 miles per hour over the trestle.

THE Georgia Pacific R. R. is opened for traffic from Atlanta, Ga., west 167 miles, to Birmingham, Ala. Two sections, comprising about 120 miles of track between Birmingham and the Mississippi river, are also completed.

THREE new railway lines into Dubuque, Ia., will be put under construction this winter.

THE Memphis, Marion and St. Francis River R. R. Co., has been organized. The capital is $100,000; the directors are A. Fogolmon, R. D. Barton, of Crittendon county, Ark., and P. M. Patterson and J. D. Randle, of Memphis; and the road is to run from near the mouth of Old River, near Hopefield, through Marion, Crittenden county, to Lake Grandee and Crawfordsville to a point on the St. Francis River, twenty-five miles from the starting point.

THE Montreal & Lake Champlain Junction Railway is now completed as far as Fort Covington, N. Y. It will be connected with the Rome, Watertown & Ogdensburg road by an independent link 12 miles west of Malone, N. Y., thus securing the Grand Trunk line, to which the Montreal & Lake Champlain Junction road really belongs, a through line to Chicago on that side of the river by way of Buffalo. The line will be a most important acquisition to the Grand Trunk Road. The Ontario & Pacific Railway Company has, it is said, so far completed preliminaries that work will be begun soon. This line, which is really a branch of the Northern Pacific, is claimed to be 350 miles shorter than the Canadian Pacific.

A COMPANY has been formed with a capital of $700,000 to build the Cannelton branch of the Louisville, Evansvile & St. Louis Air Line.

THERE are now no fewer than twenty-two railroad lines running into Chicago and the total arrivals and departures of trains foot up to 850, in the twenty-four hours. The Illinois Central sends out 40 trains.

THE Saugatuck and Aspetuck Valley Railroad Survey from Saugatuck station, Conn., to Reading is being rapidly finished by the Consolidated road company, who will begin building as soon as the surveys are done.

THE earnings of the Norfolk and Western R. R. for October show an increase of 26 per cent. and for ten months of 24 per cent. over earnings of same time last year. The proportion of expenses to gross earnings for October is 42 per cent.

M. E. INGALLS, of the Big Four Railroad systems is buying property in Covington, evidently a preparation for a bridge over the Ohio, leading the Kentucky Central into the Union Depot in Cincinnati. These proceedings have been conducted so secretly that the purpose was not apparent until within the last few days. The bridge will be built soon.

THE charter of the Texas, Oklahoma and Kansas Railway Company has been filed. The road is to begin at or near Kansas Pass, in the county of Arkansas, or Nueces, running thence in a northerly direction to Red River. The capital stock is $5,000,000. The following gentlemen are incorporators: Gen. J. B. Gordon, of Atlanta, Ga.; Wm. B. Sterick, H. C. Commegs, New York, and H. A. Lewis and W. A. Knott, of Wichita Falls, Tex. Work is to be begun immediately.

THE agents of the Chicago and North Wisconsin Company have been busily engaged in Galena hiring hands and purchasing tools to begin the work of grading the road just surveyed between that city and Savanna. From 250 to 350 men, fully equipped, are now at work at three different points along the line of the survey between Galena and Hanover, and a heavy force is at work at the Savanna end of the route. The line of this road runs alongside the old Galena and Mississippi intersection route, which the Chicago and Northwestern Company have occupied. The latter organization is expected to begin operations on their Galena and Savanna extensions at once.

A DESPATCH from Springfield, Ill., reports the incorporation of the Chicago, Ritchie and Danville Railroad Company, with J. Gauch, Russell Sage, A. L. Hopkins, of New York, and J. E. Green, of Louisville, incorporators. The road will run from Danville, Ill., to Ritchie, and is understood to connect the Wabash and Louisville and Nashville systems and give them a new air line to the South.

ON EVACUATION DAY 33,200 passengers were carried on the bridge cars. The total receipts from traffic on the bridge that day were $2,150, which is the largest amount received on any single day since the bridge was opened.

W. H. ROACH, manager of the La Crosse, Iowa and South-western, addressed a meeting at Des Moine, (Ia.) lately: He said that engineers were running preliminary lines between La Crosse and Charles City; that the money had been raised at La Crosse to pay for that part of the survey and at St. Joseph for the South-western part of it; that the road would either run from Boone or Des Moines to St. Joseph, and in either case would run through or near Winterset.

HARRISBURG, Nov. 27.—A charter was granted to-day to the Cherry Grove and Hickory Valley Railroad Company, the line of which will run from near Garfield, Warren county, to West Hickory, Forest county, a distance of twenty miles. The capital of the company is $120,000. L. R. Freeman, of Warren, is President.

THE Denver, Utah & Pacific, is surveying a route between Denver and Salt Lake, that will be 480 miles in length.

THE elevated railroads of this city carried more passengers on Monday than on any single day since the roads have been in operation, except one—the day that the great bridge was opened. The Third avenue line carried 188,502 persons, and received $15,235 for fares. The Sixth avenue line carried 105,408 persons, and received $8,887.10. The Ninth avenue line carried 37,345 passengers and received $3,009.95, and the Second avenue line received $2,137.45 for carrying 30,393 persons. The total number of passengers that traveled on all the roads was 361,648, and the total revenues $29,269.50. This is the largest sum of money ever received for fares by the elevated railroads in one day.

THE New York & Connecticut Air Line Railroad location has been approved by the Railroad Commissioners, substantially as submitted. The commissioners have granted an extension of time to enable the company to comply with certain legal requirements. When this is done and part of the right-of-way secured, the construction of the road will commence.

MR. D. M. EDGERTON, who is interested in the construction of the Inter-State Elevated railway, at Kansas City, has been to St. Louis, to consult with C. Shaler Smith, engineer of the road. It is confidently expected that there will be no relaxation of effort until the road is in operation. It is rumored that besides the Wyandotte connections, a branch of the road running to Armourdale is in contemplation.

AFTER the corps of engineers in the employ of the proposed Delaware Water Gap and Southwestern Railroad who passed through Huntingdon several weeks ago had been in Alexandria several days, another corps in the service of the Pennsylvania Railroad arrived there and commenced a survey along the bed of the old Pennsylvania canal. There will be some rivalry between the two companies for a route through that part of the county. The Pennsylvania has the advantage in owning the bed of the canal and in having a road from Hollidaysburg to Williamsburg, Blair county, leaving a gap of only twelve miles from the latter place to the main line at Petersburg.

THE RIO GRANDE COMPANY has closed a contract with Mr. C. A. Deane, of Denver, for a delivery of railroad ties for 1,600 miles of road. Some twenty camps of choppers are now established, extending from Texas Creek to Buena Vista and Gunnison City. Only red spruce and yellow pine ties are procured, as experience has shown that these varieties of conifer are the most enduring of our native wood. Between 300 and 400 men and 50 teams will be employed. The number of ties now under contract by board measurement, exceed 7,000,000 feet of lumber.

IRON, METAL AND COAL MARKETS.

PHILADELPHIA, NOV. 29, 1883.

The movements in Pig Iron for the past week have been confined chiefly to forge, which is sold in considerable quantities, prices ranging all the way from $17@$19, average sales having been made at $18 for good brands. The standard and special brands of Foundry are comparatively scarce and are held firmly by the strong companies. Ordinary quotations are from $20.50@$21 for No. 1; $19@19.50 for No. 2, though inferior brands have sold at $20@$18.50 respectively. Muck Bars are in dull demand. Some sales have been made at $33, but the better makes are held at $34. Foreign Irons are nominal. $30.50@$21 for Bessemer with offers at and under $20; Spiegeleisen ranging in price from $29.50@31; Merchant Bar shows no improvement. The recent drop in prices has not improved demand, and only store lots are selling at $2.10. Most of the iron is selling at 2c. and Western Iron is offered in eastern Pennsylvania less. Plate Tank and Structural Iron are in good demand for current requirements at steady prices. There is a prospect of heavy business during the winter and very low prices are named in response to inquiries received. Offers for large lots of Steel Rails are in hand at $34@$34.50, but $35 is the lowest price named for large lots for winter delivery and no heavy orders are being placed. Small lots for early delivery are selling freely at $36@$37. There is a strong probability of a further reduction in prices within the next six months. Scrap Iron is in fair demand at $24@$25 for selected; $22@$22.50 for cargo and $18@$21 for No. 2. Nails are selling freely at $2.75@$2.90.

PITTSBURGH, PA., Nov. 29, 1883.

The trade in manufactured iron continues dull and unsatisfactory. The ordinary quotations are from $1.80@$2, but large lots will not command over $1.75, and there are offers in hand at $1.60@$1.70. Production has been greatly restricted and stocks in first and second hands are very light. No improvement can be reported in nails; the trade is of small dimensions and usual prices are from $2.50@$2.60. Muck Bars are very dull. No sales are reported, but $32 is quoted. Wrought-Iron Pipes and Tubes are in declining demand. Prices remain unchanged at from 73@75 per cent. off list for gas and steam pipe, and 60 per cent. off for tubes. Steel rails have been sold at $36 cash at mill, with $35 offered for large lots for winter delivery. The production of Merchant steel is being restricted. Prices are irregular and trade dull. Railway Track Supplies are in active demand. Crop ends $23.50 for American; $25 for foreign. About 2,000 tons of Gray Forge Iron have sold at $17@$18. Foundry is in less active demand at $18@$21. Wrought Scrap $22@$22.50; ordinary $20@$21. Car-Axles $30@$32.

COAL.

There are no new developments in the coal trade. Last week's production, 700,000 tons; production to date this year, 28,500,000 tons. Prices are firm in all markets. Stocks at Port Richmond, 90,000 tons; stocks at Chicago and Milwaukee are declining. Delayed vessels are arriving at Port Richmond and Elizabethport. The utmost despatch will be necessary to complete December orders. Manufacturing demand is very dull; domestic demand active. Southern requirements are still large and the position of the trade in all respects, such as to meet the most sanguine expectations of producing interests. There are offers in hand at lower than current prices. The Bituminous coal trade is organizing for restrictions.